

Understanding the factors that link climate change and communal conflict in the West African Sahel

AA

Basak Kalkavan Master's Thesis Spring 2017

First Supervisor: Dr. Corinna Jentzsch Second Supervisor: Dr. Louise van Schaik

Acknowledgements

I want to thank to my parents, Oktay and Nazan, who sacrificed so much for me to become who I am today. Without their endless support and love, I could not have gotten to this point.

Mom, dad, thank you. I love you.

Table of Contents

Acknowledgements List of Figures & Tables List of Abbreviations

1. Introduction	1
1.1. Organization of the Thesis	2
2. Literature Review	3
2.1. Previous Research	3
2.1.1. The Securitization of Climate Change	3
2.1.2. Human Security, Climate Vulnerability and Resilience	5
2.1.3. Communal Conflicts	6
2.2. Theoretical Framework	7
2.2.1. Environmental Security	8
2.2.2. Horizontal Inequalities	9
	10
3. Research Design.	12
3.1. Methodology: Small -N Comparative Analysis	12
3.2. Variables: Conceptualization and Operationalization	14
2.4. Strengths and Limitations	15
3.4. Strengths and Limitations	10
4. Empirical Analysis	18
4.1. Introducing the West African Sahel	18
4.1.1. Conceptual Definitions	22
4.1.2. History of Tension Between Land Users	23
4.2. Mali	25
4.2.1. Climate Change and Mali	
4.2.2. Communal Conflicts in Mali	
4.2.3. Case Analysis	
4.2.4. Conclusion	43
13 Burking Faso	11
4.3. Durking Paso	
4.3.1. Childre Charge and Durking Paso	
4.3.2. Futants and Fastoral Communities in Durkma Fastorian	
4.4. Case Comparison: Mali and Burkina Faso	53
4.5. Exploring the Truth: Why No Communal Conflict in Burkina Faso?	57
4.5.1. Other Potential Factors	57
4.5.2. Conclusion	65

5. Conclusion	67
5.1. Main Findings	67
5.2. Research Limitations	68
5.3. Shortcomings and Recommendations for Future Research	69
5	

Bibliography ANNEX

Word Count: 20,867

List of Figures & Tables

Figure 1. Conceptual Framework	5
Figure 2. Mechanisms	12
Figure 3. The Sahel Region	19
Figure 4. Rainfall Variation in the Sahel: 1951-1975 and 1976-2000	20
Figure 5. Droughts Timeline	21
Figure 6. Livelihood Systems in the Sahel	22
Figure 7. Mali's Administrative Divisions and Ethnic Groups	27
Figure 8. Vulnerability Index of Mali	
Figure 9. % Basin Area Impacted by Extremes, and Natural Hazard Vulnerability	29
Figure 10. Current Trend in Summer Temperature – Increase per Decade	30
Figure 11. Changes in Average Annual Rainfall	31
Figure 12. Agricultural Land in Mali (1961 – 2007)	32
Figure 13. Livestock in Mali: 1961 – 2007	
Figure 14. Burkina Faso's Administrative Divisions and Ethnic Groups	45-46
Figure 15. Natural Hazard Vulnerability	47
Figure 16. Average Monthly Temperature and Rainfall Changes (1901 – 2015)	48
Figure 17. Agricultural Land in Burkina Faso (1961 – 2014)	49
Figure 18. Climate Change Vulnerability (Mali and Burkina Faso)	54
Figure 19. Human Development Report	55

Table 1. Socio-Economic Indicators in the Sahelian West	22
Table 2. Conflict of Interest over Natural Resources within Intra-Production Systems	24
Table 3. Communal Conflicts in Mali	35
Table 4. Climate Related Communal Conflicts in Mali	36
Table 5. HDR Country Comparison	55
Table 6. Agricultural Production in Mali and Burkina Faso	56

List of Abbreviations

United Nations
United Nations Security Council
United Nations Environment Programme
Uppsala Conflict Data Program
Social Conflict Analysis Database
Climate Change and African Political Stability
The Hague Centre for Strategic Studies
Non-Governmental Organization
Armed Conflict Location and Event Data
Horizontal Inequalities
Most Similar Systems Design
Sea Surface Temperature
Erosion Productivity Impact Calculator
Hadley Centre Coupled Model
Canadian Global Coupled Model
Phytomas Plant Growth Model
Nutrition Balance Analyzer Model
Intergovernmental Panel on Climate Change
Office Ritz Mopti
Gestion des terroirs
Commission villageoise de development
United Nations Development Programme
Human Development Report
Human Development Index
Inequality-adjusted Human Development Index
Gender Development Index
Gender Inequality Index
Multidimensional Poverty Index
Common Property Resources

1. Introduction

Whether it is human-induced, or natural, there is a growing consensus that climate change is a reality and it is a security threat (Bob et al. 2014; Barnett and Adger 2007; McDonald 2013). While it is possible that climate -driven environmental stress might create opportunities and positive outcomes, it is generally accepted that it will have "severe consequences on the lives and livelihoods of millions of people around the world" (Barnett and Adger 2007:640). Despite this, there has not been a consensus on the relationship between climate change and violent conflict to date (Adger et al. 2014; Meierding 2013; Klomp and Bulte 2013; Theisen et al. 2013; Buhaug 2010; Burke et al. 2009). What is certain is that "climate change acts as a 'threat-multiplier'", directly exacerbating the existing political, economic, social and environmental vulnerabilities of the people (Huntjens and Nachbar 2015:1).

The impacts of climate change reach across borders, but certain areas are particularly susceptible; one of them being the Sahel zone in sub-Saharan Africa (IPCC 2014). The Sahel is "dubbed 'ground zero' for climate change" due to its highly vulnerable population and extreme climatic conditions (IRIN & OCHA 2008, para.1). It has already experienced the first 'climate wars,' referring particularly to clashes between sedentary farmers and herders (Mjos 2007). A rich body of case-study literature has assessed the relationship between these different producer groups in Africa (Benjaminsen and Ba 2009; Benjaminsen, Maganga and Abdallah 2009; Witsenburg and Adano 2007; Moritz 2006; Turner 2004). Still, how exactly, and why, climate-induced environmental stress leads to conflicts in some areas and not others require attention.

Climate-related conflicts often take the form of a 'communal conflict', which is fought between communally-identified groups along ethnic, language and religious lines. In Africa, the concepts of ethnicity and livelihood are closely linked to one another. Since farmers and herders often belong to a particular ethnic group, it should not come as a surprise that climate-related conflicts are most likely to occur among different land users. As such, these communal conflicts are often fought over access to resources such as land, pasture and wells (Sundberg et al. 2012). Extreme and unreliable weather patterns caused by climate change reduce the availability of these natural resources. As competition increases over resources access, inter-group tensions sometimes turn into a violent clash, resulting in casualties and material damage. In selecting the area of focus for this thesis, I was first and foremost inspired by the Planetary Security Initiative. The aim of this project is "to increase awareness, deepen knowledge, and to develop ... policies and good practice guidance" to help various actors to sustain peace and cooperation when facing climate change and other global environmental challenges (Planetary Security Initiative, 23 March 2017). One of the recurring themes of the Planetary Security Conference in 2016 was the need to avoid one-size-fit all approach in developing solutions, and "to be sensitive to contextual factors unique to each socio-ecological system" (Homer-Dixon 1994:20). Not only these debates have confirmed that the implications of climate change could vary across time and space, but they have also recognized the need to expand the scope of the discussions beyond the national level.

However, literature on the climate-conflict nexus has predominantly focused on armed conflicts, in which the state is one of the perpetrators, while paying little attention to dynamics taking place on the sub-national level (Fjelde and Nilsson 2012). Additionally, the existing literature is still unable to provide a robust argument for why certain areas experience conflict due to climate impacts but not others. Thus, in an attempt to address this gap in the literature, this thesis seeks to evaluate the context in which climate-induced environmental stress acts as a catalyst for communal conflict in the West African Sahel, particularly by looking at Mali and Burkina Faso. This requires me to study two specific, yet interlinked, questions: *How does climate-induced environmental stress impacts vulnerabilities? What factors need to be present for communal conflicts to occur?*

1.1. Organization of the Thesis

This research contains five chapters. In Chapter 2, I review the relevant literature on the concepts of climate security, human security, vulnerability and communal conflict, which provide some basis for the theoretical framework presented in the second part of the chapter. In Chapter 3, I introduce my research design, present my variables and data, and discuss the strengths and limitations of my research. The empirical analysis is done in Chapter 4 in four separate sections. Here, I first provide a background for the West African Sahel in general. Then, I study the environmental and political contexts in both Mali and Burkina Faso in detail and assess the factors that connect climate change and communal conflict. Lastly, in Chapter 5, I

discuss the main findings, revisit research limitations and offer recommendations for future research.

2. Literature Review

The literature review begins by summarizing previous research that identifies climate change as a security concern; conceptualizes human security, vulnerability and communal conflict; and finally introduces two theoretical frameworks to understand the relationship between climate change and conflict.

2.1. Previous Research

2.1.1. The Securitization of Climate Change

Climate change is described as "any change in climate over time caused by natural variability or human activities" (Yanda and Bronkhorst 2011:2). As Adger (2006) points out, it "represents a classic multi-scale global change problem in that it is characterized by indefinitely diverse actors, multiple stressors and multiple time scales" (p.273). Evidence suggests that the impacts of climate change will have far reaching effects, and considerably increase the burden on societies that are already vulnerable to climate variations; these impacts will undermine both ecological and social systems (Barnett and Adger 2007; IPCC 2007).

The last few decades have witnessed a shift in the conceptualization of climate change. The concept, once a concern of environment ministers, became a topic to be discussed at the United Nations Security Council (UNSC). This shift towards the securitization of climate change followed a shift in the perception of the issue in the eyes of policy makers. In 2003, the Pentagon commissioned two scenarios to understand the implications of sudden climatic events for international security. These scenarios resulted in the classification of climate change "as the 'mother of all security problems" (Brown 2007:1141; Stipp 2004, para.1). Shortly after, Sir David King, the chief scientists of the British government, argued that "climate change is a far greater threat to the world's stability than international terrorism" (BBC News 2004, para.1). In addition, in April 2007, a group of eleven high ranking admirals and generals released a report stating that "climate change will act as a 'threat multiplier' that makes existing concerns, such as water scarcity and food insecurity, more complex and intractable, and [thus] presents a tangible threat to … national security interests" (Brown et al 2007). As a threat multiplier, it is believed that climate change carries a diverse set of "secondary risks, such as violent conflict, political instability, population displacements, poverty and hunger" (Ruttinger et al. 2015:5). Moreover, a

report by the United Nations Environment Programme (UNEP) in June 2007 recognized a linkage between the conflict in Darfur and climate change, emphasizing the implications of the issue for peace and stability (UNEP 2007). With these developments, the significance of climate change for conflict and security has finally caught the political imagination, and created a noticeable shift in the way the issue is being addressed by decision-makers.

Figure 1 captures the conceptual framework of how climate change might exacerbate the vulnerabilities and act as a threat multiplier. It is built on the 2009 report of the UN Secretary-General on *Climate Change and its possible security implications* (UN General Assembly 2009; Hamro-Drotz 2014). Changes in the vulnerability-inducing climate variables such as temperature, rainfall, drought, flood and sea-level rise can disrupt: (1) food and water securities and health issues; (2) and the availability in natural resources. These, in turn, could lead to migration, resource competition, political instability, and localized conflicts.



Figure 1. Conceptual Framework

Source: Hamro-Drotz (2014).

2.1.2. Human Security, Vulnerability and Resilience

In discussing the security implications of climate change, some limit their understanding to conflict and military matters (Buhaug 2010; Hsiang, Burke and Miguel 2013); while others embrace a wider notion of human security that encompasses its impacts on livelihoods, vulnerable populations, food security and migration (Barnett and Adger 2007; Scheffran et al. 2012). The 2005 World Summit Outcome defines human security as "the right of all people to live in freedom and dignity, free from poverty and despair," and recognizes that "all individuals, in particular vulnerable people, are entitled to freedom from fear and freedom from want, with an equal opportunity to enjoy all their rights and fully develop their human potential" (A/RES/60/1, para.143). The significance of human security concept for climate change discussions is acknowledged in the 2014 IPCC Fifth Assessment Report, which suggests that changing availability of land and water resources could pose risk to human security by undermining individuals' ability to look after themselves via limiting their access to vital resources (McCarthy et al. 2001). Including the human security concept into climate -security discussions is both constructive and instructive for a number of reasons: first, it covers a broader range of potential security implications of climate change, and second, it brings the policy focus on environmental, development and economic issues (Heinrigs 2010).

The primary emphasizes of human security is the individual; yet, "the processes that undermine or strengthen human security are often external to the locality of populations where individuals reside" (Barnett and Adger 2007:641). Africa, for instance, is believed to be one of the most vulnerable places to the impacts of climate change; yet, even within Africa the effects are not distributed evenly. This naturally raises the question of how we can understand vulnerability and what makes a place vulnerable to security implications of climate change.

The idea of vulnerability is generally understood as susceptibility to losses (Wisner 2004:184). More specifically, the IPCC defines it as "the propensity or predisposition to be adversely affected" (IPCC Working Group II Report 2014:3). It is contrasted with the concept of resilience, which is understood as "the degree to which countries, communities, families or individuals are able to adapt to change" (Busby, Smith, and Krishnan 2014:52). In the context of exposure to climate events, resilience also refers to the capacity to "rebound, recoup or recover from a stimulus" (Rademaker 2016:9). Vulnerability determines the seriousness of climate-related event based on political, economic, social or demographic factors (Brooks, Adger and

Kelly 2005). This suggests that vulnerability to ecological disasters may partially be explained by physical exposure; social disadvantages such as poverty and political marginalization are also important indicators of vulnerability. (Raleigh 2010). Limited political power and assets further restrict access to resources, narrowing the range of options available in times of stress (Raleigh 2010).

2.1.3. Communal Conflicts

The concept of conflict itself is a natural part of our daily lives, and it should not be treated as a synonym for violence. Coleman (2003) defines conflict as "the experience of incompatible activities", which "prevents, obstructs, interferes, injures" the presence or effectiveness of another activity (Coleman 2003:6; Deutsch 1973:10). These experiences "can be observed within and between people and groups of people, can be expressed or left unexpressed, and can be experienced by the parties to the conflict or by observers external to the conflict" (Coleman 2003:6). This definition of conflict fits into Mitchell's (1981) conception of 'social conflict', which he defines as "any situation in which two or more social entities or parties perceive that they possess mutually incompatible goals" (cited in Brottem 2013:69).

Literature on the climate change-conflict nexus has prominently focused on the national and regional levels, while disregarding the massive implications this might have on the subnational, or communal, level. The organization of a rebel movement requires resources, planning, know-how and mass of motivated recruits, and a civil conflict further necessitates a government that responds to its population with a military force (Buhaug 2015). These ingredients are not available to every society; hence, we may not always observe civil conflicts, despite potential causes of conflict being present. Climate change might have wider implications for other forms of political instability such as communal conflicts, which are generally seen as likely outcome of environmental stress than large-scale violence (Uexhell 2014; Theisen 2012; Field et al., 2012; Cederman and Gleditsch 2009).

Elfversson and Brosche (2012) define communal conflict as "violent conflict between non-state groups that are [informally] organized along a shared communal identity" (para.3). Communal identity within this context is not only limited to ethnic or religious identity, but rather it incorporates any form of identification that is based on, for instance, a common history, culture, livelihood or core values. At the center of many communal conflicts is land. As such, research that study communal conflicts often focus on clashes between sedentary farmers and nomadic herders (Hussein et al. 1999; Turner 2004). At its core, communal conflict¹ is different than other types of armed conflict²; however, its consequences – the extent of suffering, damage, dislocation of individuals, etc. - can potentially be just as destructive.

This literature overview suggests that the dynamics of climate change and its security implications are nothing but complex. While there may be disagreements on how climate change affects conflicts around the globe, there is a general consensus that it is a security threat that needs to be addressed urgently. It also suggests that it is no longer so easy to separate climate change's effects on different units – individual, national, international - as these are interlinked. Yet, the units of analysis that focus on the national and international levels continue to dominate the climate-conflict discourses. With individuals and communities being just as susceptible climate change, it is necessary to widen the scope of the existing literature to include the forces taking place on the sub-national level.

2.2. Theoretical Framework

In order to recognize an empirical climate-conflict relationship, we need to have the "knowledge about how [conflicts] happen, which requires theories that can explain the causal pathways that result in conflict" (Gemenne et al. 2014:6). For my research, I have identified two frameworks that I believe would provide the most comprehensive analysis – *environmental security* and *horizontal inequalities*. Especially within the context of climate-conflict nexus, I see these two frameworks complementary. While social, political and economic dimensions of conflict have received much attention in the literature, biophysical factors have been overlooked. Additionally, as stated earlier, climate change could act as a conflict catalyst by interacting with the existing social, political and economic circumstances. As such, by using two frameworks - one focusing on the environment and one on the socially constructed inequalities – I seek to

¹ UCDP/PRIO Armed Conflict Dataset operationalizes communal conflict as conflict that occurs on the sub-national level and involves informally organized groups, using any material means as arms and causing at least 25 battle-related deaths (Sundberg et al. 2012). The concept is conceptualized and operationalized in more detail in the Research Design section.

² UCDP/PRIO Armed Conflict Dataset defines armed conflict as: "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths" (Gleditsch et al. 2002 Version 4-2009:1).

capture the overall picture for how climate change might be connected to communal conflicts in the West African Sahel.

2.2.1. Environmental Security

In addressing the potential of climate-induced conflict, two literatures use the concept of vulnerability to frame their approach. The 'environment-security' discourse privileges ecological causes in determining conflict risk, and treats resource 'scarcity' as the central focus (Raleigh 2010). It incorporates the issues of distribution and marginalization into conflict models. Both of these aspects are viewed as "functions of physical proximity and access to scarce resources," which are to be facilitated by increasing demographics and pressures on natural resources (Raleigh 2010:71).

The resource scarcity framework offers four key claims to link environmental degradation and violent conflict. First, environmental causes of violent conflict primarily involve natural resources such as land, water, forests and fish. Second, environmental stress is the product of the combination of environmental change, social inequality and population growth, and these factors are mutually reinforcing. Lastly, societies with higher adaptive capacity are more likely to avoid violent conflict and instability (Homer-Dixon 1994; Percival and Homer-Dixon 1998; Raleigh and Urdal 2007). Following a neo-Malthusian line of argument, the resource scarcity framework assumes that individuals, who are deprived of their livelihoods and politically marginalized, do not have any choice apart from fighting for survival (Homer-Dixon 2004). Moreover, it is easier for individual grievances to turn into group grievances in societies that are divided along ethnic, cultural and religious lines (Kahl 2006).

The environmental security framework offers several case-based accounts of armed conflict and environmental issues, especially in Sub-Saharan Africa (Kahl 2006). Yet, research that assess the causal mechanisms between climate and conflict has so far offered inconsistent results (Gleditsch 2012). Theisen, Holtermann, and Buhaug (2011) conducted one of the most comprehensive large-*N* studies, and their findings did not find any substantial evidence to confirm the link between drought and civil war. Additionally, the robustness of studies that does find evidence for a climate – civil war linkage has been heavily criticized (Buhaug 2010; Gleditsch 2012). This is because research focusing on the changing availability of natural

resources find that political and economic factors play a more significant role in determining the risk of civil wars ((Hendrix and Glaser 2007; Raleign and Urdal 2007; Theisen 2008).

One potential explanation for the contradiction between the weak empirical evidence in the large-*N* studies and the strong claims offered by the environmental security literature might be the almost exclusive focus on armed rebellion involving the government in the former. The dataset used in these large-*N* studies focus on armed conflicts on the national level, and do not capture communal conflicts. Much of the arguments within the environmental security framework provide that pressures on primary natural resources are likely to spur inter-group violence rather than conflicts involving the state (Fjelde and von Uexkull 2012).

2.2.2. Horizontal Inequalities

The theory of horizontal inequalities (HIs), in other words inequalities among culturally defined groups, suggests that "when cultural differences coincide with economic and political differences between groups, this can cause deep resentment that may lead to violent struggles" (Stewart and Brown 2007:222). These inequalities differ from "vertical inequalities (Vis) which measure inequality among individuals or households, not groups" (Stewart 2009:3). HIs offer several dimensions: economic HIs focus on issues such as ownership of assets, employment opportunities and income levels; social HIs look at access to various social services including accommodation, health care and education; political HIs concern about the disparities in power distribution and political opportunities; and cultural HIs focus on the recognition of customs, dialects and practices (Stewart 2010).

The relevance of any of these elements depends on their significance for the livelihood of a particular group. Land, for instance, is extremely important in many African countries where agriculture accounts for most income and employment. While each form of HIs stands on its own, they continuously interact with one another. Political power, for example, is both an end and a means as inequalities within this context often have implications for social and economic discriminations (Stewart 2010). Particularly in the case of Africa, patrimonial politics are the foundation of political systems (Raleigh 2010). This political structure is based on the political power, or status, of ethnic communities, favoring some groups over others. Hence, ethnic communities are distinguished by their political 'relevance' and 'irrelevance'. This dynamic of political exclusion is important for climate-conflict discourses as vulnerability to climate change

does not only concern physical exposure. Factors such as poverty and political marginalization also affect communities' vulnerabilities by limiting their access to resources such as food and water, and by reducing their capacity to cope with environmental stress (Gurr 1993; Scarritt 1994). This then shapes the interactions among ethnic groups vis-à-vis social grievances, and their reactions to scarcity or distributional matters (Raleigh 2010).

With this in mind, I seek to test the following hypotheses.

H1. *Climate-induced environmental stress leads to communal conflict when some social groups are politically marginalized.*

The link between political marginalization and communal conflict within the context of climate change is to be observed through several mechanisms – competition for resources, perception of a lack of justice and mobilization by the political elite. These mechanisms are not limited to this study, they could be observed in other cases within conflict and peace studies as well. While these mechanisms could be treated separate from one another, this study seeks to treat them as a package, in which in order to establish a link between the variables, all three mechanisms need to be present.

1. Competition for resources

Climate change reduces the availability of natural resources *physically*, while political marginalization creates *socially constructed* boundaries, determining who has access to what/when/how (Homer-Dixon 1994). Shortages of natural resources as a result of climate change and political exclusion, as well as demographic growth, push different groups to compete for these vital resources for survival, which in some situations result in violent conflict (Mbaiwa and Darkkoh, 2005; Homer-Dixon 1994).

2. Perception of injustice

One or both groups perceive a sense of injustice or disrespect from the other. Especially when these groups are formed along ethnic lines, groups "see their vital interests threatened by other groups" (Horowitz 1985:565). For instance, sedentary farmers might feel this way when their crops are damaged intentionally or the damages are not being compensated adequately. For

herders, this might occur as agriculture production and land tenure systems interfere with their livelihoods.

3. Mobilization by the political elites

Varshney (2002) and Posner (2005) argue that elite plays an important role in ensuring and maintaining political stability. When the elite is unified, meaning when it is "sufficiently cohesive, freely communicative internally, and, regardless of it ... affiliation," political stability in a given place can be expected (Higley, Field and Groholt 1976). It is because such unification symbolizes the shared desire for how the society is to be managed. In countries, where this unification is not present, then the elite could be seen to mobilize its constituencies for power and access to resources.





3. Research Design

3.1. Methodology: Small-N Comparative Analysis

The existing literature on the climate-conflict nexus shows that more in-depth analysis on the sub-national level is needed in order to understand the dynamics between these two phenomena and to develop appropriate solutions. Large-*N* studies have not been able to capture the implications of climate change for conflict dynamics, as these studies have focused on armed conflicts involving the state, rather than conflicts on the community level. This may be due to the availability of data on the national level, and difficulty of collecting such information on the sub-national level. Moreover, the effects of climate change vary, sometimes significantly, across time and space. Identifying an 'average' effect across heterogenous sample may not always be productive, unless a common causal effect, provided by good theoretical frameworks, is expected (Buhaug 2015). For this purpose, I conduct a small-*N* comparative analysis with a Most Similar Systems Design (MSSD). More specifically, I construct a two-step approach: (1) in-case process tracing and (2) case comparison.

Stage I. Process Tracing

In the first stage of this research, I use process tracing to assess the contexts in which communal conflicts have taken place. Brottem (2013) states that "it is exceedingly difficult to pinpoint the exact causal relationship between environmental change, human response and social conflict;" yet, process tracing can allow the researcher to unfold the processes and mechanisms between two phenomena (pp.20). Process tracing requires the reviewing of several types of sources, such as interview transcripts, official documents, historical accounts, various reports, and others to identify "whether the causal processes a theory hypothesizes or implies in a case are in fact evident in the sequence and values of the intervening variables in that case" (Kirwin 2010:97).

Collier et al (2004) view process tracing as a chain of observations, as opposed to "multiple observations of the same phenomena" and note that causal process observation "provides information about mechanism and context" (pp.253). Subscribing to this view enables me to identify and analyze the causes of the conflict, the actors involved, the framing of the issue, and whether these events translated into a violent communal clash. At the very least, process tracing "allows [me] to offer a chronology of the events," which is important "to establish the causal chain" (Kirwin 2010:98). In this regard, small-*N* analysis is an appropriate choice of approach as it is "best situated for confidently inferring the nature of causal order" (Lieberman 2005:441).

Stage II. Case Comparison

Case Selection

In the second stage, I conduct a comparative case study based on the identified mechanisms in process tracing. By doing this, I intent to explore the variation in the dependent variable (the occurrence of communal conflict), in order to better understand the factors that affect its presence (Varshney 2002). I focus on two West African countries in the Sahel zone as my case studies, namely Mali and Burkina Faso. The Sahel zone is particularly interesting for any analysis that concerns climate change and conflict. The region has already experienced the first 'climate wars', in which different groups, such as farmers and herders, have engaged in ongoing clashes over natural resources (Mjos, 2007). Dubbed 'ground zero' for climate change, the Sahel contains highly vulnerable population and experiences extreme climatic conditions (IRIN & OCHA, 2008).

I choose Mali and Burkina Faso as case studies for several reasons. Their similarities – geographic location, poverty, diverse ethnic groups, dependence on land and water for livelihood, recurring drought, colonial history – allow me to conduct a Most Similar Systems Design (MSSD). Despite their similarities, Burkina Faso is a relatively peaceful country within the region and it has not experienced a communal conflict³. This makes Burkina Faso an exceptional case within the region and raises the questions of 'how does climate-induced stress increase vulnerabilities?' and 'which factors need to be present for communal conflicts to occur?'

In addition to the need for more sub-national level analysis, research on the occurrence of communal conflicts, as a result of climate change, tend to focus on the dependent variable. Studying cases in which both communal conflict and environmental stress exist creates a

³ See Section 3.2. for the conceptualization and operationalization of communal conflict.

^{14 |} Climate Conflicts?

selection bias and does not allow to systematically study the role of climate change as a catalyst for communal conflict. For this reason, I focus on cases that have different outcome of interests.

3.2. Variables: Conceptualization and Operationalization

Dependent Variable

The dependent variable, *communal conflict*, is conceptualized and operationalized according to the 'Non-State Conflict Dataset (Version 2.5-2016),' a project by the Uppsala Conflict Data Program (UCDP) at the Department of Peace and Conflict Research at Uppsala University (Sundberg et al. 2012). Communal conflict is generally recognized as conflict standing along lines of communal identity. More specifically, the UCDP defines it as conflict that occurs on the sub-national level, which involves informally organized groups, using any material means as arms, and causing at least 25 battle-related deaths. "These are not groups that are permanently organized for combat, but who at times organize themselves along said lines to engage in fighting. This level of organization captures aspects of what is commonly referred as 'communal conflicts'" (Sundberg et al. 2012:4).

Within the scope of this research, communal conflict specifically refers to land conflict. Climate-induced environmental stress, in the form of drought, excess rainfall and extreme variations in the weather patterns, has immediate impact on communities that heavily depend on natural resources such as land and water. In West Africa, and sub-Saharan region, agricultural practices are the primary source of food security and economic opportunities. Hence, I seek to study communal conflicts that occur among and/or within different land users.

Intervening Variable

Climate-induced environmental stress is treated as an intervening variable. Provided by the Economics of Planetary Security, a report by the Clingendael Institute and The Hague Centre for Strategic Studies (HCSS), environmental stress refers to "human and naturally induced pressure on the environment. As a subset of this, [climate-induced] stress refers to negative environmental impacts caused by gradual changes in atmospheric conditions" (Rademaker et al. 2016:8).

Environmental stress from climate change can be operationalized by looking primarily at the impacts of variations in temperature and rainfall on communities' ability to access to water

and food supplies. As local communities' livelihoods are largely dependent on the environment for food security and economic opportunities, studying the changes in the availability of food sources, and changes in the behavior and practices of the producer groups allows me to understand the impacts of environmental stress on communities.

In conceptualizing climate-driven environmental stress, I seek to look at the continuous/gradual impacts of climate change as opposed to sudden shocks. The logic behind this choice is that this research does not treat climate change as a triggering event, rather it understands it as an intervening variable. The study at hand seeks to understand how climate related environmental stress changes the relationships between different groups over time. Furthermore, even in the cases of sudden climatic shocks, the effects of such shocks could often be observed for a long period of time. Thus, conceptualizing climate change as a continuous event fits better within the framework of this research.

Independent Variable

The independent variable of this research is *political marginalization*. The conceptualization and operationalization of the variable is determined by two sub-variables: (1) land tenure and cultivation rights, and (2) political representation. An analysis of land tenure and cultivation rights whether these policies are discriminatory in nature. More specifically, by looking at these policies, I seek to find whether any particular producer group is excluded from the discussions of resource management and allocation. Secondly, I look at the representation of different groups within the government to see if any particular group is excluded from high-level positions. Therefore, I consider a group to be politically marginalized if: (1) the needs and rights of that group are not reflected within the land tenure policies, and (2) if the group has not been appointed for high-level positions within the government.

3.3. Data Collection

In conducting this research, I relied on the existing academic articles/journals, various datasets and other sources that are more qualitative in nature, such as local non-governmental organization (NGO) reports/documents, United Nations (UN) reports/documents, newspaper articles, books and already conducted interviews.

In order to identify communal conflicts, I studied and compared several datasets. Non-State Conflict Dataset Version 2.5-2016 by UCDP; Social Conflict Analysis Database (SCAD) by Climate Change and African Political Stability (CCAPS); and Armed Conflict Dataset by the Armed Conflict Location and Event Data Project (ACLED) all provide detailed accounts of different kinds of conflicts occurring around the world. I avoided relying on a single source for data collection to ensure that I include all the recorded incidents.

To assess the changes in climatic patterns, and their implications for communities' livelihoods, I collected information from various sources, including but not limited to, the World Bank Data, Food and Agriculture Organization of the UN (FAO), the United Nations Environment Programme (UNEP), USAID, The Hague Centre for Strategic Studies (HCSS), and official reports from the governments of Mali and Burkina Faso. Lastly, information and contextual knowledge about political marginalization of groups primarily retrieved from academic papers and NGO reports.

3.4. Strengths and Limitations

This research consists of several strengths and limitations. First and foremost, the topic is highly relevant for the present day global security issues. Until recently, climate change was considered purely as an environmental concern; today, it is a "global threat ... that know[s] no borders" (John Kerry, 2014). This shift in the perception certainly emphasizes the potential of climate change in impacting our societal stability; yet it also suggests that we are yet to understand the true capacity of climate change and its mechanisms in doing so.

The study contributes to the existing literature in three ways. First, it studies the relationship between climate change and conflict by focusing on the sub-national level, which is an area that has been largely ignored. Understanding the dynamics taking place on the national, regional and international levels are important for any climate-conflict discourses; yet, this should not be done at the expense of local level assessments. In order to develop appropriate solutions and implement them effectively, climate-conflict dynamics on the local level also need to be taken into account. Second, the choice of methodology, small-*N* comparative analysis, allows me to identify local issues and processes. Unlike large-*N* studies, small-*N* studies provide more detailed analysis of the dynamics on the ground as it is known for having high interval validity.

Moreover, this research focuses on two cases, Mali and Burkina Faso, which have different outcome of interests. Research in this field has tried to understand the climate-conflict nexus by selecting cases that have experienced both climate change and conflict. This creates a selection bias and leads to false conclusions, as the findings might not reflect what is happening elsewhere. By selecting cases with a different outcome of interest, I attempt to avoid committing a selection bias. Lastly, two different theoretical frameworks, environmental security and horizontal inequalities, are used in conducting this thesis. Since climate change acts as a threatmultiplier, using different approaches provides new insights about the climate-conflict relationship.

In addition to these strengths, there are also several limitations. The selection of small-*N* analysis as the methodological approach is inherently known for having high internal validity and low external validity (George and Bennett 2005:25). This high internal validity allows me to develop a theory about the link between climate change and communal conflict. However, having a low external validity means that it is not realistic to "make robust generalizations when [there is] a sample of just two cases" (Halperin and Heath 2012:217). Until such a theory can be tested across more cases, the findings of a small-*N* analysis cannot be confidently generalized.

Another limitation concerns the scope and focus of this research. Due to the inability to conduct a field research and to collect data in person, there is a heavy reliance on the existing data and literature for information and contextual knowledge. This makes it a challenge to collect information on a local level, especially when only very limited data exists.

Finally, the operationalization of communal conflicts might exclude incidents that could be otherwise considered as communal conflicts. Communal conflict in this research is operationalized using at least 25-battle related deaths as the minimum threshold. As such, other incidents that result in less than 25-battle related deaths are not included. This might create a selection bias on its own; however, this is not the intention of this research. The decision to operationalize communal conflicts in this way is influenced by the availability of data and the scope of the study.

4. Empirical Analysis

4.1. Introducing the West African Sahel

The Sahel is the "semi-arid and arid region of Africa", covering several countries, such as "Senegal, Gambia, Mauritania, Mali, Burkina Faso, Niger, Chad and Sudan" (Heinrigs 2010:5). Different accounts also suggest that the Sahel constitutes a "wider latitudinal belt," extending to parts of the Ivory Coast, Ghana, Benin, Togo, Nigeria, Cameroon and Ethiopia (Nyong, Adesina and Osman-Elasha 2007:789). Annual grasses with shrubs, stunned trees and bushes make up the vegetal cover of the region; yet, these are much denser in the south (Figure 3).





Source: WMO (2001) in Heinrigs (2010).

The Sahelian zone is in fact one of the most productive crop regions in Africa (NASA 2004). Despite its productivity, the region has a "dark history of famine tied to highly erratic rainfall" (NASA 2004, para.1). The difference in rainfall between the northern fringes and the south equals to approximately 400-500 mm (Brooks 2004). Additionally, the region has been experiencing a decrease in the overall annual rainfall levels, with "an increase in inter-annual and spatial variability" (Figure 4) (Nyong, Adesina and Osman-Elasha 2007:789).



Figure 4. Rainfall Variation in the Sahel: 1951-1975 and 1976-2000

Source: Global International Waters Assessment 2004; SDRN/FAO; SWAC/OECD (2007) in Tremolieres (2013).

Drought has been a recurring occurrence in the region for centuries; yet, the intensity and magnitude of these events have been on the rise (Figure 5) (Hulme et al. 2001). The unprecedented and long-lasting drought from the late 1960s to the late 1980s had resulted in the death of thousands of people and millions of animals (Mortimore 1998). According to the Palmer Drought Severity Index, drought still exist in the Sahel, and these events are "consistent with scenarios of anthropogenic enhanced greenhouse warming as described in modelling studies" (Nyong, Adesina and Osman-Elasha 2007:789). These findings suggest that the sea surface temperature (SST) has an important role in regulating precipitation in the Sahel zone. In fact, variations in the temperature of the ocean surface can explain more than a third of the observed rainfall variability in the region (Heinrigs 2010). The modelling studies suggest that the correlation between rainfall in the Sahel and the Tropical Indo-Pacific SST is negative, while there is a positive correlation with the Atlantic meridian SST gradient.



Figure 5. Droughts Timeline

Source: Sahel and West Africa Club Secretariat (SWAC)/OECD (2010) in Tremolieres (2013).

There is a visible difference of livelihood systems between northern and southern Sahel (Figure 6). While pastoralism is largely practiced in the northerly cultures, the southern region tends towards sedentary farming. Agriculture is the major source of livelihood system, contributing almost 40 percent of the GDP and employing over 50 percent of the working population (Table 1) (Nyong, Osman-Elasha and Adesina 2007). As such, agriculture makes up the main source of food security and economic opportunities in the region, and is closely linked with climatic trends and environmental conditions. Despite its significance, farming and irrigated agriculture only makes up five percent of the total land, and it is only possible around the perennial rivers. As such, extreme changes in rainfall and temperature are the biggest factors hindering agricultural production (Nyong, Osman-Elasha and Adesina 2007).





Source: CILSS; FAO; FEWSNET; SWAG/OECD in Heinrigs 2010.

	Total Population (in million)	Rural Population	Agricultural population* (in % of total)	Populatio	on Density	Agricultural value added (% of GDP)
				(People per km ²)	(Agr. pop. Per arable land** km ²)	
Senegal	15.13	56	726	537	284	15.4
Gambia, The	1,990.92	40	784	1295	357	20.3
Mauritania	4,067.56	40	52 ²	33	355	20.8
Mali	17,599.69	60	74	13	197	40.3
Burkina Faso	18,105.57	70	92	61.8	261	35.7
Niger	19,899.12	81	83	13	81	36.5
Nigeria	182,201.96	52	26	197 ¹	110	20.2

Table 1. Socio-Economic Indicators in the Sahelian West

* Agricultural population refers all individuals that depend on agriculture, fishing, hunting and forestry for their livelihood. It includes individuals that are economically active in agriculture sector, and their non-working dependants. / ** FAO defines arable land as "land under temporary crops, temporary meadows for moving or for pasture, land under market or kitchen gardens, and land temporarily fallow." Source: World Bank Data (2015); FAO. (¹ 2016 / ^{2,3,4,5,6,7} 2005)

4.1.1. Conceptual Definitions

Pastoralists and farmers are considered as two different producer groups, even though both can engage in livestock ownership and farming (OECD 2013). There exists a significant difference between them in terms of management and resilience (Turner 2004).

Pastoralism

The concept of pastoralism is understood as an economy that is based on raising livestock, and it is often carried out by nomadic and sedentary communities. Nomadism is "the extent of spatial movement of the groups in question" (Shettima and Tar 2008:164). Thus, pastoral production and the extent of mobility can be understood as conceptually different from one another. Nomad groups could in theory obtain multiple resources to increase their incomes. Pastoralism, on the other hand, could also be undertaken from a fixed location. What is important to understand is that nomadism "represents an integral social, political and environmental dimension of pastoralism" (Shettima and Tar 2008:165). It is essentially "the technique and technology" of pastoralism (Shettima and Tar 2008:165).

Pastoralists' strategy of moving around for grass and water enables them to "have access to heterogenous and unpredictable pasture resources, rather than relying on the hypothetical stability or uniformity of those resources" (Thebaud and Batterbury 2001:70). Pastoralists lead their cattle towards seasonal ponds during the vegetation period; and move to farm land at the beginning of the dry season, following the completion of the harvest (Adams and Mortimore 1997). The majority of pastoralists include diverse range of animals in their herds, and engage in trading, hunting and gathering to increase their sources of income.

Sedentary Crop Farming

Crop farming is a production system carried out by sedentary farmers. These groups are generally recognized as "farmers living in permanent settlements gaining their livelihood mainly from crop production, with domestic animals providing supplementary income" (Hussein 1998:12). Regarding the livelihood strategies, farmers need to adapt to different seasons, as well as in-between periods. A farming year is organized around seasonal rainfall patterns; thus, it can be divided into three periods: planting, weeding and harvesting (Mortimore and Adams 2001). Similar to pastoralists, many farmers also have sought alternative sources of income, both onfarm and off-farm, to diversify their dependence on certain resources (Abdulai and CroleRees 2001).

4.1.2. History of Tension Between Land Users

Conflict between different types of land users is neither new nor limited to a particular geographical region. Conflict between settled and pastoral groups can be found in various earliest written records and is "mythically symbolized in many cultures" (Blench 2003:1). Conflict of interest could be observed between all kinds of groups, such as among herders, among farmers, and between farmers and herders (Table 2). These tensions in most cases lead to resource competition; yet, they do not always turn into violence clashes.

Table 2. Conflict of interest over natural resources within the intra-production system

Type of Producer	Conflicts of Interest
Farmers vs. Farmers	High productivity fields (e.g. flood pool resources)
Herders vs. Herders	Dry season grazing (Tuareg vs. Fulani)
Farmers vs. Herders	Use of wetland resources

Source: Moorehead (1991) in Hussein (1998):23.

The sub-region of the West African Sahel has been seeing increasing number of conflicts over resources that involve sedentary farmers and mobile pastoralists. Against the context of resource scarcity, environmental degradation, demographic change and political volatility, the region perhaps is showing signs of what Kaplan (1994) refers as 'the coming anarchy'. One the key elements of this 'anarchy' is farmer-pastoralist conflict, which is profoundly engrained in the region's history, ecology and political economy.

This widespread existence of conflict between farmers and herders in this region is "due to a seasonal incompatibility between two different livelihoods" (Brottem 2016:549). Following the rainy season, farmers plan to harvest their crops, and at the same time, herders attempt to provide water and pasture to their animals before dry season begins in the same area. Historically, there has generally been a balance between these two land users regarding to the land usage. However, changing weather patterns, environmental conditions and livelihood strategies for adaptations have altered the 'traditional schedules' of farmers and herders; and intensified the tensions between these two producer groups. Fjelde and von Uexkull (2012) argue

that these conflicts between farmers and herders are "seen to be a more probable outcome of climate change" than other circumstances (Brottem 2016:549).

The traditional systems of production, processing and marketing dominate the livestock sector in West Africa; and the big share of the sheep, camel, goats and cattle belong to nomadic and semi-nomadic pastoralists. The pastoralists move within an extensive range of land, between the semi-arid north during the rainy season, and the humid south during the dry season (Moritz 2006). The dependence on pasture and land for their herds require the nomadic and semi-nomadic pastoralists to move within and across national boundaries, making it inevitable to contact with settled crop farmers.

Although such interaction may not be favorable at times, in reality, the survival of both the pastoralists and crop farmers depend on the interaction between the two groups. Pastoralists need to access to farmland for grazing their animals, and the calories produced by the crop farmers. Farmers, in return, require the dairy and protein produced by the pastoral groups. According to Monod (1975), the existence of pastoralists relies on the contact with sedentary people. The two are connected, and such connection requires them to share the same resources such as land, water and fodder.

4.2. Mali

As a landlocked country (area: 1,240,278 square kilometres), Mali experiences four bioclimatic zones: Saharan, Sahelian, Sudanian and Guinean (Coulibaly 2017). Eighty percent of the labor force is occupied by agricultural activities, which make up approximately 50 percent of the country's GDP. The agricultural sector is dominated by small-scale traditional rainfall-dependent farming, and it mainly includes "cotton, millet, rice, corn, vegetables, peanuts; as well as cattle, sheep and goats" (CIA 2017: n.a.). Despite its heavy dependence on agriculture, the suitable land for it only constitutes to 14 percent, making sustainable land management a key concern (Climate Change Knowledge Portal 2017).

Mali has a population of 17,467,108 (July 2016 est.), and an annual growth rate of 5.3 percent (CIA 2017). The country consists of eight administrative divisions and thirteen ethnicities categorized into five groups (Figure 7): the Manding group, involving Bambaras and Malinkes, representing approximately 40 percent of the population; the Sudanian group, including Sarakoles, Sonrhai, Dogons and Bozons (20 percent); the Voltaic group, including Senoufos, Miniankas and Bobos (12 percent); the nomadic group, including Fulani, Tuaregs and Moors (17 percent); and the remainder, including Tocouleurs and others (11 percent) (Coulibaly 2017).



Figure 7. Mali's administrative divisions and ethnic groups

Source: Van Veen, Goff and Van Damme (2015); Chauzal and van Damme (2015)

4.2.1. Climate Change and Mali

Mali is particularly vulnerable to climate change due to its low economic development, limited land suitable for agriculture, and ongoing poverty. At the same time, climate change poses a threat to the country's development efforts, and its ability to provide basic services such as health and nutrition (The World Bank Group 2011). Figure 8 displays the overall vulnerability of Mali to climate change, which includes 18 indicators⁴ categorized into three vulnerability components: climate exposure, sensitivity and adaptive capacity⁵ (USAID 2014). As shown in the figure, such vulnerability is higher in the areas of Mopti and Gao, due high climate variability; while the southern and southwestern parts of the country are less vulnerable. In these

⁴ See Appendix A for a full list of indicators.

⁵ See Appendix B for vulnerability index of each component.

^{27 |} Climate Conflicts?

findings, it is important to note that population distribution and the vulnerability index are not always treated independently. It is estimated that the areas with medium-level vulnerability are home to approximately 40 percent of Mali's population, while another 32 percent live in areas of medium-high vulnerability. In contrast, those living within the highest vulnerability zone make up only six percent of the population (USAID 2014).



Figure 8. Vulnerability Index of Mali⁶

Mali has been exposed to droughts and floods for many decades (Figure 9). The longlasting drought from the late 1960s to the late 1980s has caused detrimental effects on the society. The overall rainfall has decreased by 30 percent since 1968, destroying more than a third of livestock and leading to widespread food shortages (Holthuijzen 2011). The migration of pastoralists towards near permanent water sources due to these events has led to considerable overgrazing, and increase in tension between different communities. Crop losses in and around Mopti, Segou and Tombouctou regions is often explained by "extended dry spells, poor rainfall and dry conditions" (The World Bank Group 2011:7).

Source: USAID (2014).

⁶ USAID excluded all areas north of 17.2°C latitude in this climate vulnerability mapping as the region is very sparsely populated. USAID provides two justifications for this: (1) measuring vulnerability is more meaningful for populated areas and climate variability may not have too much of an impact in this region due to already harsh conditions; (2) including data for the region may skew the results for the remainder of Mali.



Figure 9. % Basin Area Impacted by Extremes and Natural Hazard Vulnerability (+ve for flood; -ve for drought)

Temperature and Rainfall Variations

Since the 1960s, the mean annual temperature in Mali has increased by 0.8°C, which is estimated as an "average rate of 0.15°C per decade" (E&ES 2015:2). However, specific locations have different rates; for instance, the northern part has seen an increase of 0.5°C per decade during the summer season (Figure 10). Furthermore, the frequency of hot nights between 1960 and 2003 has significantly increased; while the frequency of cold days during summer seasons has substantially decreased (Ministry for Environment and Sanitation, Mali 2008).

Source: The World Bank Group (2011)



Figure 10. Current Trend in Summer Temperature - Increase per Decade

Rainfall, on the other hand, is less predictable than ever (Carvalho and Rozen 2016). While the early 1960s, 1990s and 2000s have seen particularly wet periods, other years were noticeably dry (Climate Change Knowledge Portal 2017). The National Direction of Meteorology finds that there has been an overall decrease in rainfall since the 1960s. The annual precipitation levels have normally varied between 500 and 1500 mm in the 1950s; yet, these levels have not exceeded 1300 mm in the past two decades (E&ES 2015). Additionally, the areas once received 1200mm of rainfall has shrunk significantly (Figure 11). The impacts of this decrease in rainfall could already be seen as early as the early 1970s in the central Inner Niger Delta. The flooded surface in this area had shrunk by 27,500 km² between 1969 and 1973 (Ministry for Environment and Sanitation, Mali 2008).

Source: USAID (2014); E&ES (2015)
Figure 11. Changes in Average Annual Rainfall

1951-1970 (Left) and 1971-2000 (Right)



Source: Diallo, M.M.A. (2011) in E&ES (2015).

Mopti region of Mali is one of the areas in which the agricultural sector is concentrated (The World Bank Group 2011). It is critical for the country's food security and is also "endowed with many ecosystem services" (The World Bank Group 2011:2). In Gao region, agriculture, livestock and fisheries are practiced in the valley along the Niger river. The magnitude of food production in Gao is lower than of Mopti due to, in part, its exposure to different climate variations (USAID 2015). Nevertheless, the wealth of both of regions, in terms of their capacity to provide food and income, depends on the Niger river. The flow of the Niger river in Mali has decreased "from 1300m³/second in 1978 to 895m³/second in 2002" (E&ES 2015:2). This, combined with the shrinking inundated surface of the central Inner Niger Delta, means decreasing resources and increasing competition for different land users, whose survival depends on the land.

Changes in Land Use Patterns

Forestry, pasture and agriculture are considered to be the major forms of land use in Mali, and the stability of crop production is closely linked to rainfall (Giannini et al. 2017). The Sahelian center of Mali has experienced a major decrease in agricultural production following the abnormally wet years of 1950s and 1960s, and drought and famine of the early 1970s (Watts 2012). Since then, the sector has been improving, despite the "most severe multiyear drought of the instrumental record (1982-84)" (Giannini et al. 2017:148). Agricultural land has been expanding for the past 40 years, even though precipitation has not fully recovered. During the 1990s, arable land has doubled, and "tripled in the 2000s with respect to 1961" (Giannini et al. 2017:148) (Figure 12).



Figure 12. Agricultural Land in Mali (1961-2014)

Source: FAO (2017)

This expansion of the agricultural land had negative implications for forest land, which has decreased by approximately 10 percent in the past two decades (FAOSTAT 2017). Several institutions (UNCCD 2010; WRI 2010) state that desertification rate will further increase in parallel with the increasing temperature. The mean annual temperature in Mali has already increased by 0.8°C since 1960. It is expected that decrease in rainfall and increase in extreme weather events will accelerate deforestation, and the pressure on forest land will further increase due to desertification (FAO 2012).

Additionally, changes in the environment and the expansion of agricultural land meant increased number of herders moving into agricultural zones, where pasture and water are available. The droughts had forced pastoralists to move further south, and to settle in locations where they had traditionally only spent short periods of time. In his research, Brottem (2016) found that the number of pastoralists and livestock residing in the southern region of the country during the dry season has increased gradually (Figure 13). These extreme weather events had severely impacted the mobility of pastoral communities, and "contribute[d] to the increased frequency of farmer-herder conflict in the area" (Brottem 2016:549).





Source: FAO in Brottem (2016).

Food Security

One of the difficulties in assessing the impacts of climate change on food security is the lack of data on the past trends on this subject. Yet, there are projections by several biophysical models, using 2030 conditions as base, that provide some insights about what increasing temperate and unreliable rainfall might mean for the availability of food resources – of crops,

forages and livestock – in Mali. These predictions about the future allow us to build assumptions about how increased temperature and extreme weather events might have impacted food sources.

Simulations by the Erosion Productivity Impact Calculator (EPIC), which are projected by the Hadley Centre Coupled Model (HADCM) and the Canadian Global Coupled Model (CGCM), indicate that certain crops are more resilient to the impacts of climate change than others (Butt et al. 2005). Cotton yields show an increase, while the responses of millet depend on the location. Among the crop yields, the most vulnerable appears to be sorghum, and it is expected to decrease significantly. The HADCM suggests that "collectively 33 out of 48 cropregion cases" will experience yield losses (Butt et al. 2005:362). The predicted decrease of sorghum yields in sub-humid areas, for instance, appears to be more modest (5-7 percent) compared to other areas with drier conditions (about 18 percent). The CGCM, on the other hand, provides slightly higher predictions for yield loss; yet, the overall trends offered by both models match one another.

In regards to forage yields, the Phytomas Plant Growth Model (PHYGROW) estimates a decrease between five to 36 percent. The main reason for this is "the combined loss of grass basal area due to over grazing and reduced woody plant cover due to fuelwood harvesting, coupled with increasing temperatures during the growing season" (Butt et al. 2005:364). Additionally, the impact of climate change on livestock is assessed by the Nutrition Balance Analyzer Model (NUTBAL). According to this model, all livestock – cattle, sheep and goats – is expected to decrease, among which cattle appears to be the most vulnerable. NUTBAL suggests that the increased temperature will lead to loss of appetite, and ultimately result in "loss of weight and lower growth rates" (Butt et al. 2005:365).

In Mali, a decrease in the availability of food sources not only means food insecurity but also livelihood insecurity. As mentioned earlier, Malians depend on the land for both food and economic opportunities. The predicted losses in these livelihood sources could translate into an "overall loss of welfare," ranging between \$70 and \$142 million (Butt et al. 2005:370). It would also mean an increase in the risk of hunger from about 44 percent to over 70 percent of the population.

4.2.2. Communal Conflicts

In Mali, the military *coup d'état* of 2012 has received much attention for the discussions over the security implications of climate-induced environmental stress. While conflicts between pastoralists and the government over land, as well as other political and social factors, have been well studied and acknowledged, clashes taking place on the communal level have been largely overlooked.

Conflict between different communal groups is almost a daily occurrence in Mali, and in the West African Sahel in general. Yet, as discussed earlier, 'conflict' could take many forms and could have different consequences. In Mali, several communal low-intensity conflicts (less than 25 battle-related deaths) have taken place over the years; yet, these were not included in this study as it would not be possible to operationalize all of them. Using the framework set out by the Non-State Conflict Dataset by the UCDP, I identify only seven communal conflicts that turned into a high-intensity conflict, resulting in at least 25 battle-related deaths (Table 3).

Actor 1	Actor 2	Start Date	End Date	Fatalities Est. ¹	Location
Fulani	Salsalbe	08-12-1993	08-12-1993	29	Mopti Region
Fulani	Tuareg	05-07-1997*	05-07-1997	34	Gao Region
Arab	Kunta	14-07-1999	16-10-1999	59	Gao Region
Dogon	Fulani	25-05-2012**	25-05-2012**	40	Mopti Region
Fulani	Tuareg	06-02-2014*	06-02-2014	30	Gao Region
Fulani	Bambaras	06-05-2016**	06-05-2016	30	Mopti Region
Fulani	Bambaras	13-02-2017**	13-02-2017	30	Mopti Region

Table 3. Communal Conflicts in Mali

* This conflict is believed to be originated in 31-03-1997 but the given episode of conflict activity reached 25 battlerelated deaths on this date.

** Day assigned; month and year precisely coded.

¹This is the best estimation for fatalities.

Source: UCDP; International Crisis Group; Anadolu Agency (AA) News; RFI Afrique; Daily Sabah News; Kabore (2008)

The compiled list of communal violence in Mali highlights two points: first, communal conflicts between different land users are mainly seen in Mopti and Gao regions; and second, Fulani herders, with the exception of one incident, were involved in all of the violent clashes. It is not surprising that the resource-related disputes would be seen in Mopti and Gao regions (along the Niger river) as different livelihoods "cohabit and utilize" the same territory, putting pressure on the resources available (Straus 2011). However, this list does not speak for the

dynamics of these conflicts. While there are seven communal conflicts that had occurred in Mali, my findings conclude that the elements environmental stress and scarcity caused by climate change were only present in some of these conflicts (Table 4).

Clash	Year	Fatalities Est.	Location	Climate- Related?
Fulani - Salsalbe	1993	29	Mopti Region	Yes
Fulani - Tuareg	1997	34	Gao Region	Yes
Arab - Kunta	1999	59	Gao Region	Uncertain ⁷
Dogon - Fulani	2012	40	Mopti Region	Yes
Fulani - Tuareg	2014	30	Gao Region	Uncertain
Fulani - Bambara	2016	30	Mopti Region	No
Fulani - Bambara	2017	30	Mopti Region	No

Table 4. Climate-related Communal Conflicts in Mali

As I seek to understand under what conditions climate driven environmental stress could lead to communal conflict, in the following sections, I disregard the communal conflicts that were not relevant for climate-related discussions. In the next section, I first provide a short summary of the three climate-related conflicts to inform the reader about the context of these events. Then, I analyze these conflicts using the lenses of environmental security and political marginalization.

Communal Conflict: Fulani Herders and Salsalbe Herders (1993)

The conflict between Fulani herders and herders from the villages of Sosobe and Salsalbe took place on 8 December 1993, in the Mopti region. The clash between the two producer groups left 29 dead and 42 wounded (Kobane 2008). The two land users have always had tensions between them due to the "contesting claims to a grazing territory" in Mopti region, dating back to colonial years (Moore et al. 1999:15). Fulani claimed that the territory belonged to them since the pre-colonial era, and that Salsalbe, together with other ethnic groups, were their *Rimaibes* (ancient slaves). Salsalbe herders, on the other hand, demanded that the authority to manage the land belonged to them as they have been the occupants of this area for many years.

⁷ Two conflicts – Arab/Kunta (1999) and Fulani/Tuareg (2014) are classified as uncertain as there is not a strong evidence to suggest that climate-related stressed played any role in these incidents.

Mopti region is highly demanded as it offers "some of the best remaining pastures for livestock and pastoralism" (Kobane 2008:38). Following the wet years of 1990s, the region saw an "increased demand for flood-recession land" by both farmers and herders (Kobane 2008:38). The variations in rainfall, required Fulanis to move north at a later time, at the beginning of the delayed rainy season. As a result, Fulanis remained longer by the flood-recession land and took advantage of the growing grasses in this zone (Moore et al. 1999). Fulanis' extended stay in the area was not welcomed by Salsalbe herders, as they could not graze their own animals properly due to the presence of the Fulanis. This frustration between the groups turned into a violent clash.

A local security expert stated that it is still common to see "people [getting] killed in disputes over access to the *bourgoutieres*⁸" to this day (Interview cited in the International Crisis Group 2016, para.16.). Disputes like this among different land users have been also "aggravated by the lack of legal clarity regarding land rights" (International Crisis Group 2016, para.16). Information about who initiated the attack remains unknown; yet, what is certain is that these disputes have become increasingly more lethal "following the increased availability of weapons since the 1990s" (International Crisis Group 2016, para.16).

Communal Conflict: Fulani Herders and Tuareg Herders (1997)

The violent clash between Fulani and Tuareg groups occurred on 5 July 1997 in the Gao region. Similar to the case of Fulani – Salsalbe conflict, Fulanis and Tuaregs had also ongoing tension prior to the clash. Historically, Fulani communities have been regular victims of attacks conducted by the Tuaregs (Chauzal and van Damme 2015). Following the 1984-85 drought, Tuaregs' control over lands was decreasing (Stiles 1997). The environmental conditions during this period forced Tuareg herders to move their herds south or to sell them, and those that did not migrate fell into poverty. Tuareg were also excluded from other ethnic groups that had access to land and livestock trade. These groups were not only "intensifying livestock production and grazing to maximize profits," but were also practicing an unsustainable production system (Johnson, Mayrand and Paquin 2006:49).

At the same time, Fulani people perceived themselves as the victim of cattle theft, for which they held Tuaregs accountable. Following the signature of the National Pact in 1992,

37 | Climate Conflicts?

⁸ The *bourgoutieres* are plains subject to flooding and are particularly fertile after floods.

which attempted to "establish a special status" for the northern region of Mali, Fulanis asked the government to be compensated for their losses. Fulanis have expressed similar demands for many times but none were fulfilled, "strengthening among the Fulanis the sense of impunity, injustice, and animosity toward to Tuareg nomadic communities with which they frequently compete for the control of the same territory" (International Crisis Group 2016, para.13).

The tensions between these two groups finally erupted in 1992, but it is not known who initiated it. The clash resulted in the death of 34 people. While it is not known what kinds of tools were being used by both parties, one could expect that lethal weapons were involved in the clash. The availability of these weapons at the time, flowing in from Libya, and the number of fatalities, lead to making such an assumption.

Communal Conflict: Dogon Farmers and Fulani Herders (2012)

On 25 May 2012, Dogon farmers and Fulani herders clashed in Mopti region, leaving 40 people dead, mostly Fulani men. According to local authorities, the conflict between Fulani herders and Dogon farmers of 2012 originated from an agreement between Mali and Burkina Faso, allowing Burkina herders to enter into Mali for pasture land (Reuters 2012: n.d.).

Historically, Dogon farmers have resided in harsh environments, where drought, famines and localized floods hinder crop production and cause humanitarian crisis (Douny 2016). During the first half of the century, Dogon communities were exposed to successive periods of famine due to drought and floods. During the second half of the century, the droughts of 1973 and 1983-84 destroyed millet production. The drought of 2012 and the political crisis in the country have further worsened resource scarcity and deteriorated the relationship between other communal groups. Dogon farmers were neither able to provide land for livestock grazing, nor interested in hosting Fulanis (Douny 2016). They also did not trust the Fulani, and "opposed the opening of [the] corridors" to them (Reuters 2012: n.d.). As Fulanis claimed the rights to access to the area, Dogon farmers decided to solve the issue by attacking the Fulani settlements, taking advantage of the lack of security presence in the area (International Crisis Group 2016). This also made it difficult for the Burkinabe government to address the issue as "[they did not] know what officials to talk to in the [border] area" (Chilson 2010: para.2). The attack "has remained unpunished, [playing] a direct role in the decision by nomad Fulani groups to arm themselves" (International

Crisis Group 2016, para.15). During the same year, some even decided to take part in the radical movements taking place in the Gao region.

4.2.3. Case Analysis

Involvement of the Fulani

In all climate-related communal conflicts, Fulani people were present. Fulanis⁹ are considered as one of the largest ethnic groups in the region, and are present in all West African countries. Bruijn (2000) states that the Fulani identity is very 'permeable' in the sense that they are often treated as immigrants, despite having lived in the same location for many years. During the colonial era, social identities were constructed based on ethnicity and occupation. Hence, livelihoods and ethnic identities are strongly tied to one another, and pastoralists are commonly associated with the Fulani ethnic group in West Africa (Hussein 1998).

The power relations between Fulani people and other ethnic groups have changed dramatically. Previous to colonial era, Fulanis had several empires, dominating different regions of today's West Africa (Kirwin 2010). During this time, Malian society had adopted and implemented informal systems of land use and tenure that "supported the local production systems and encouraged herder-farmer relations in the process" (Davidheiser 2011:82). Yet, this customary system was undermined by the introduction of a new political system, property rights and land tenures, increasing herder-farmer incompatibility, and putting pressure on natural resources (Kirwin 2010). Such change in the system also had significant implications for conflict dynamics within the local level, as customary mechanisms for conflict management were eliminated (Davidheiser 2011).

Environmental Context

These conflicts were underlined and shaped by several structural conditions; yet, the changing climate has played an additional role in driving these incidents. Decrease in the availability of water, high-quality farmlands and other precious resources, due to drought, irregular rainfall patterns and unreliable climatic conditions, have all forced herders to migrate into farming lands and aggravated the competition between different land users (Straus 2011). The long-term effects of drought, together with the expansion of agricultural zone, have

⁹ Fulani people are also identified as: Fula, Silimisa, Sosobe, Pulaar, Fulbe, Wodabe and Borroro.

^{39 |} Climate Conflicts?

"eliminated perennial grasses in the northern zone and substantially reduced their abundance" across much of the central and southern zones as well (Brottem 2016:554).

In these incidents, each land user had grievances with the other party. Pastoralists felt frustration as practices and resources that ensure their survival were being threatened by the changing weather patterns and the expansion of agricultural zones. By the same token, farmers distrusted herders, and were not willing to share the already decreasing resources. These ecological borders also represented ethnic and cultural borders. "They [became] lines of demarcation, where people [met] to co-operate or to fight" (Tremolieres 2013:63). The notion of scarcity was not exclusively a physical concept, but also a socially constructed one. In this sense, "vulnerability to environmental conditions [was entangled with other] social and political forces" (Watts 2012:3).

Political Context

The new political scheme introduced by the French regime replaced the traditional systems and promoted inequality by favoring certain ethnic groups at the expense of others. Since the French took control over the region, both the colonial and post-colonial governments in Mali mistrusted the 'primitive' nomadic communities, such as Fulani, Tuaregs and Arabs, and attempted to settle them. Pastoral groups were seen as "the other,' the inhabitant of the wilderness, not belonging to civilization" (Bruijn, Beek and Dijk, n.d.:61). Their livelihoods were portrayed as obstacles to progression, urbanization and modernization; and as incompatible with the ideals of a strong and developed nation (Holthuijzen 2011). Despite the historical evidence that mobile livestock systems in the Sahel have shown "high adaptive capacity and ecological economic efficiency," land tenure reforms have disregarded these facts and emphasized for agriculture expansion (Watts 2012:3). This could be explained by the fact that "most of the senior leadership of post-colonial Mali were drawn from the southern ethnic groups, who were not sympathetic to the pastoral culture of the ... nomads" (Douglas-Bowers 2013, para.4). Farmers, on the other hand, were praised, and their traditional agricultural methods were treated as the golden ticket to development and growth. As a result, pastoral groups were "sedentarized" by various reforms (Holthuijzen 2011:252).

This shift from mobility to "*sedentism*" have led to marginalization of many pastoralist communities (Brooks 2006:4). It has exacerbated these communities' vulnerability in the face of

changing environmental conditions as their coping mechanism - their mobility - was taking away from them. It also created a significant discrepancy within balance of power, which played an important role in decreasing pastoral people's access to land for production (Davidheiser 2011). As Frantz (1975) states:

"The more rapid incorporation of farming peoples into the developing larger political systems resulted in decreasing control of land and cattle among the pastoralists – this, at a time when rapid growth in the agricultural, commercial, and industrial sectors had generated a larger volume of competition and conflict over basic natural resources" (p.14).

In addition to sedentarizing pastoral communities, key aspects of land reforms introduced by Europeans aimed at privatizing and nationalizing the land (Davidheiser 2011:83). These policies significantly limited the control and use of land by indigenous populations, while contributing to environmental degradation. These "exclusive property regimes" have continuously resulted in the "overuse of the resource base, amplification of negative effects of drought periods, and increased conflict between nomads and farmers, among nomadic groups, and within nomadic groups" (Van den Brink, Bromley and Chavas 1995:392; Davidheiser 2011:83). Some of these policies and reforms, such as nationalization of land, had begun during the colonial era, but then continued after independence under the authority of the southern elites. This was particularly harsh for the pastoral communities as territories that were important for the transhumant Fulani production system were claimed by the ruling governments (Davidheiser 2011).

However, most post-colonial governments failed to nationalize land effectively in many rural areas in Mali. This, combined with the newly introduced land tenure arrangements, favoring agriculture over pastoralism, "created situations of legal pluralism," defined as "the coexistence and interaction of multiple legal orders such as state [and] customary laws, all of which provide basis for claiming property rights" (Meinzen-Dick and Pradhan 2001, in Brottem 2013:72). The uncertainty created by these measures "came to characterize most of the regional agro-pastoral zone" (Brottem 2013:73). Since pastoralists did not have the legal resources to be

compensated for the disappearance of their grazing lands, they "began relying on extra-legal strategies such as bribery to gain protection and favorable judgements from higher-level authorities in ways that exacerbate conflicts with farmers" (Benjaminsen and Ba 2009 in Brottem 2013:73).

The expansion of agriculture following the wet periods in 1950s and 1960s "pushed pastoralists into more marginal regions and led to a breakdown in the networks connecting herders and farmers, further contributing to conflict" between these different land users (Brooks 2011:4). This, combined with the marginalization of pastoral communities, had disastrous effects when severe droughts hit during the early 1970s. Lives and livestock were loss, communities and livelihood systems were destroyed, and social disruption was triggered on a regional scale. These extreme weather events undoubtedly played a role in changing the social dynamics for the worse, but inappropriate development practices enforced by the colonial and post-colonial regimes were also just as responsible (Brooks 2011).

For instance, since the early 1970s, several development projects have been implemented in the Mopti region. The *Office Riz Mopti* (ORM), funded by the World Bank, was established "as a part of a large national initiative aiming at increasing agricultural production" (Benjaminsen et al. 2012:105). The focus of the ORM was to convert unused land into rice fields (*casier rizicole*) and to build irrigation systems for water distribution. However, these 'vacant' lands were in fact burgu lands, traditionally belonging to the pastoral communities. Since these lands were not flooded due to the droughts in the 1970s, the ORM regarded them as "underutilized and transformed [them] into rice fields" (Benjaminsen et al. 2012:106). The ORM projects are clear illustrations of how land reforms and policies have favored agriculture and discriminated against pastoralism (Benjaminsen et al. 2012). As one herder from the Mopti region said: "I don't know if the ORM benefited the farmers, but I know one thing: it destroyed the land of the herders!" (Benjaminsen et al. 2012:107).

Furthermore, since the 1990s, there was also an expansion of ethnic-based cultural associations, which had an important role for conflict resolution at the local level. These associations were created with the aim of connecting the local structures with the central government, headed by the urban elites and organized along ethnic lines. *Tabital Pulaaku*, for instance, is one of these organizations in the Mopti region representing the Fulani communities. In the face of the changing environment and discriminatory land policies, many Fulani elites

requested *Tabital Pulaaku* "to organize a response [to the growing tension with other groups], including the creation of self-defense groups" (International Crisis Group 2016, para.22). These elites encouraged their constituencies to "take up arms to defend themselves and gain the respect of the government and rival communities" (International Crisis Group 2016, para.22).

In 2001, the Malian government passed the Pastoral Charter, which is "a legislation regulating access to pastoral resources" (Cotula 2007:89). The Charter intended to give the authority to manage natural resources to the local communities; however, it failed to fulfill its mandate as it had several weaknesses. First, the formulation of the programmes and legislative text did not include the voice of the herders. It neglected the needs of the pastoral sector, especially in the north, and allowed "the *bourgoutieres*, which were important grazing lands, to be converted into rice fields" (IIED 2004:71). Secondly, the Charter was intended to provide guidelines; instead "it has become a detailed code, allowing very little flexibility for adjustment to local circumstances" (IIED 2004:71). It was further criticized for having provisions that are more appropriate for sedentarized farmers, paying "little attention … to the mobility or the instability and uncertainty of the state of natural resources in dry pastoral areas" (Cotula 2007:91). Moreover, Mali has several dozens of decrees, codes and laws that govern natural resources administration. Not only these create confusion within the local communities, but the lack of education of the local people also makes it difficult to implement the legislation.

At last, the extent of Fulani representation within the government is not clear; however, there are studies suggesting that they were not well represented, along with other non-majority ethnic groups (Gaines et al. n.d.; Smith 2014). The Malian political scene has been dominated by the Bambara elites, who have long felt resentment towards the pastoral communities of Tuaregs, Fulanis and Arabs. Following the independence, the Malian authorities have tried to repress these non-majority ethnic groups through policies that ensured political and economic marginalization of these communities. The post-colonial regimes have ignored the needs and wishes of pastoralists, and made no effort "to incorporate [them] into government roles" (Gaines et al. n.d.:16). Even the police forces that were assigned to particular localities were not representative of the local population (International Crisis Group 2016). Lack of representation and discriminatory land tenure policies all contributed to the increased vulnerability of these groups in the face of climate change.

4.2.4. Conclusion

Mali has been exposed to harsh and unreliable climatic conditions, and it has witnessed to many changes within its land management systems. The French rule left a legacy that included a production system in which agriculture was praised and livestock was dismissed. These discriminatory practices have pushed pastoral communities to marginal lands and decreased their capacities to maintain their livelihoods in the face of changing weather patterns.

The contexts in which communal conflicts occurred have consisted of resource competition among different groups and perception of sense of injustice, while involving politically marginalized Fulani people. The decrease in the availability of natural resources, in part due to climate change, has increased competition among different communities. Changes in the climatic patterns have disrupted the 'production calendars' of both farmers and pastoralists, and played a role in the expansion of crop yields. The decline in the access to natural resources due to land tenure policies, favoring agriculture at the expense of livestock production, led the Fulanis to perceive themselves as the victim of the others' actions. These dynamics have created tensions among different land user groups, and resulted in violent clashes.

On the other hand, the role of the Fulani elite in mobilizing its communities is not well established. Findings suggest that these elites had made several attempts to encourage their groups to defend their livelihoods. Yet, to what extent these attempts played a role in these communal conflicts remains uncertain. While this uncertainty suggests that more in-depth research is needed to fill in this gap; the implications of it is that it obstructs me from establishing a causal relationship between my variables, hindering the strength of this research.

4.3. Burkina Faso

Burkina Faso is a semi-arid, landlocked country (area: 274,200 square kilometres), bordering Mali to the west and north. The Sahelian ecosystem is present in the north, whereas the southern part of the country falls within the Sudanian ecosystem (Kagone, 2017). As one of the smallest economies in the world, agriculture in Burkina Faso involves 80 percent of the active population, accounting for almost 40 percent of the entire GDP (Traore 2013). Yet, Burkina Faso is still considered as "the lowest performing agricultural country in Africa" (The World Bank Group n.d.:1).

Burkina Faso has a population of 19,512,533 (July 2016 est.), and an annual growth rate of 3.01 percent (CIA 2017). The country consists of thirteen administrative divisions and approximately sixty different groups. The main ones include Mossi (52.5 percent of the population); Fulani (8.4 percent); Gurma (6.8 percent); Bobo (4.8 percent); Senoufo (4.4 percent); Bissa (3.9 percent); Tuareg (3.3 percent); Lobi (2.5 percent); and the remaining is made up of other minor ethnic groups (CIA 2017; Kagone 2017).

Figure 14. Burkina Faso' Administrative Divisions and Ethnic Groups





Source: The Joshua Project (n.d.)

4.3.1. Climate Change and Burkina Faso

Similar to Mali, Burkina Faso is also vulnerable to climate change due to its limited natural resources, dense population, poverty and dependence on agriculture for food security and economic opportunities (Climate Change Knowledge Portal 2017). Burkina Faso ranks 185 out of 188 in the United Nations Development Programme's (UNDP) Human Development Report due to its fragility to extreme weather events, together with other factors (UNDP 2017). Decrease in rainfall is followed by dust storms and temperature spikes, which have immediate effects on food supplies and yields (Climate Change Knowledge Portal 2017).

During the period of 1991 and 2009, eleven major floods and three major droughts have been recorded, affecting 479,493 people (USAID 2012). Drought remains as the "most frequent external shock to food security" in Burkina Faso as extreme fluctuations in rainfall and temperature disrupts cereal production (USAID 2012:12). In addition to drought, Burkina Faso is also susceptible to flash floods, wind storms and outbreaks of diseases (Figure 15) (Climate Change Knowledge Portal 2017). Flash floods have increased during the rainy seasons in the central and northern parts of the country (USAID 2012).

Figure 15. Natural Hazard Vulnerability



Source: Climate Change Knowledge Portal (2017)

Frequent flooding, particularly in 1988, 1992, 1994 and 1999, has severely affected certain areas. For instance, the flooding of 1992 had resulted in the loss of agricultural production of CFA Franc 1.803 billion, while in 1994 the loss was equivalent to CFA Franc 63,937,680,000 (The World Bank Group n.d.). The floods in 1994 were immediately followed by a drought, which destroyed the initial production of maize in the Haut Plateau and northern regions.

Temperature and Rainfall Variations

Since the early 1900s, dry regions of Burkina Faso have expanded towards the south (World Bank 2011; UNFCCC 2001). This period has also witnessed an increase in average monthly temperature of around +0.6°C (Figure 16), and it is further expected to rise by 1.7°C by 2050 (The World Bank Group n.d.). These dry conditions are usually seen between the months of November and December when humidity level averages 10 percent, and in the northern part of the country where rain is only available during two months out of the year (Climate Change Knowledge Portal 2017). Rainfall, on the other hand, has seen an overall decrease and it is expected to drop further by 3.4 percent by 2025, and 7.3 percent by 2050. It is also predicted that such decrease in rainfall will be accompanied by "very strong seasons and inter-annual variability of climatic factors" (The World Bank Group n.d.:2).



Figure 16. Average Monthly Temperature and Rainfall Changes (1901-2015)

These fluctuations in temperature and rainfall are expected to have detrimental impacts on the water, agriculture as well as livestock sectors, especially since Burkina Faso lacks the capacity to mitigate the impacts of climate change. Water resources will more likely to be polluted due to floods, and evaporation will be aggravated due to increased temperature. Furthermore, crops and livestock will be lost, agricultural calendars will be disrupted, production will drop and food insecurity will increase (The World Bank Group n.d.).

Food security in Burkina Faso heavily depends on the land and water. Highly variable climate, recurring droughts, dust storms and unreliable rainfall patterns all pose a threat to the availability of these natural resources, putting a great risk on the livelihoods of the people. Burkina Faso is also suffering from poor soil, with little nutrients and a low water-holding capacity (Climate Change Knowledge Portal 2017). As such, extreme fluctuations in the weather

Source: Climate Change Knowledge Portal (2017).

immediately affect food supplies and yields. Although the country has been receiving continuous foreign aid, ensuring food security remains an ongoing problem.

Changes in Land Use Patterns

The growing population in Burkina Faso, with an annual rate of 3.01 percent, has put greater pressure on natural resources and demanded a greater expansion of agriculture production. The size of the arable land has almost doubled since the 1960s (Figure 17). This, in return, meant increased deforestation and depletion of the vegetation through overgrazing, which leads to further resource stress. The expansion of agricultural land also meant decrease in the availability of grazing areas (USAID 2012). As agriculture production is expanding, areas available for livestock is shrinking, making it difficult for pastoral groups to maintain and secure their livelihoods.





Source: FAO (2017).

4.3.2. Fulanis and Pastoral Communities in Burkina Faso *Fulani People*

Fulani people make up the second largest ethnic group after the Mossis – almost 10 percent of the population. Among non-Fulani communities, Fulanis are divided into two separate groups: settled and foreigner. The former refers to those that look after the livestock of local sedentary groups, while the latter is used for long distance herders (transhumant) (Kirwin 2010). Similar to Mali, and West Africa in general, farmers in Burkina Faso use the terms herder and Fulani interchangeably. This linkage can be seen within the Fulani population as well. They, too, feel their identity to be the strongest when they are engaged in activities specific to their occupation. Interviews conducted by Kirwin (2010) shows that Fulani people feel 'as a Fulani' the most when they:

"... hold [their] cattle herding stick and wear [their] scarf.""During the periods when [their] cattle sell for a lot of money.""...they are with their cattle."

(Kirwin 2010:34).

During the Sankara era (1983-1987), the demonym for the country was changed from *Voltaique* to *Burkinabe*. The term *Voltaique* had negative connotations and it did not generate the strong national identity the government wanted to establish. The new term Burkinabe, not only avoided femininity and masculinity, but it was also strategically constructed in a way to represent the Fulani identity. The *be* in the term reflects how Fulani people refer to themselves – as *Fulbe* (Kuba 2003).

Despite the efforts of creating a strong national identity, and a political system representative of the ethnic composition of the population, Fulani people have assumed lower political profile since the end of the colonial era (Diallo 2008). They have not been appointed to high level representatives in the national government, although they make up the second largest ethnic group in the country. There are suspicions towards Fulanis, and pastoralists in general, as they frequently travel across regional and national borders. Due to their livelihood, pastoralists are associated with illegal activities that involve smuggling of good or stealing cattle (Tonah 2002). As such, they are often subject to unflattering terms, such as dishonest and untrustworthy.

Pastoral Communities

Competition between different land users do exists in Burkina Faso, especially over limited natural resources. Land-related conflicts could generally be seen among: (1) herders and farmers; (2) intra-familial; (3) autochthones and immigrants; and (4) among herders (Zongo 2009). Rural areas often experience land-use disputes between pastoralists and farmers. However, interestingly these have not translated into violent clashes among or within groups. In this sense, Burkina Faso is considered as a relatively peaceful country; especially compared to its neighbors.

Following the colonial era, governments and political leaders have taken carefully calculated steps to lessen divisions along ethnic and religious lines in Burkina Faso. Charles (2003) concludes that "Burkina is one of the rare cases, if not the only case, where a majority ethnic group, Mossi (farmers) has not monopolized the command of the central apparatuses and has not put itself in a position of complete domination" (Charles 2003 in Kirwin 2010:24). These findings are significant; but they should be approached with caution. The lack of Mossi monopoly within the political domain does not suggest that the assignments indeed reflected the ethnic composition of the country. As mentioned earlier, certain ethnic groups, in particular the Fulani, had never been appointed for high level positions within the government.

Moreover, despite the efforts of the post-colonial governments to incorporate Fulanis into the national identity, farmers have enjoyed the priority within the land tenure systems in Burkina Faso (Marty 1993). Implemented first by the colonial regime, the land tenure system, giving sedentary groups the power to decide who gets the land, continues to exist to date. Pastoral communities are not, and have not been, given the authority to dictate the land usage. As a result, farmers "control rights over pastures, while pastoral authorities are obliged to only enforce activities in their communities" (Kirwin 2010:40). The opinions of the pastoral people have not been considered for the issues of land management and allocation (Ngaido 1994).

The colonial regime had put a great emphasis on expanding the agricultural production. Animal husbandry was still included in the newly established production model; yet, it was intended to complement the agriculture rather than being considered as a productive resource on its own (Kirwin 2010). Similar to the case of Mali, national authorities considered pastoralist livelihood to be incompatible with the ideals of modernization (Diallo 2008). This agricultural model had also created new property rights to provide security and to encourage investment (Breusers 2003). As a result, "the rights of herders, compared to [that of] farmers, were circumscribed and their occupational livelihood was threatened" (Kirwin 2010:41). Post-colonial governments in Burkina Faso have more or less continued with these 'colonial policies'. Farmers have been considered as the righteous owners of the land, and pastoralists have been regarded as people wasting land resources. The expansion of agriculture, especially by Mossi farmers, has made it more challenging for Fulani to access to pasture and water resources. An elderly Fulani claimed that:

"Mossi [farmers] are people who destroy the *brousse*. Everywhere they cut trees to make their fields. They prevent us from having space and pastures for our cattle. But if there is no *brousse*, a [Fulani] cannot live, the *brousse* is life" (Breusers, Nederlof and van Rheenen 1998:362).

As part of the land tenure reform, the post-colonial regimes have implemented several donor-funded projects. One of these is the Gestion des terroirs (GdT) funded by the World Bank, UNDP and several other organizations (Kirwin 2010). Such an initiative aims to address the issues of land development and management on the local level, by involving local people. In 2007, as part of the GdT, a new initiative was introduced, Commission villageoise de development (CVD), which primarily concerns resource management and conflict resolution. One of the key purposes of the CVD is to minimize conflicts over land usage through negotiation and establishing land use zones. Within this framework, village communities are granted the authority to determine the eligibility for common property usage (Batterbury 1998). While this system was implemented to create a harmony among different land users, it is found to be "conflictual and sometimes [resulting] in the exclusion of some groups" (Kirwin 2010:63). Fulani people, in particular, hardly benefit from the system in place (McCay 2002). In fact, Marty (1993) points out that the very meaning of the gestion des terroirs, in the literal sense, is discriminatory. The term 'terroir' refers to village boundaries, which are established and practiced by farmers. This concept does not allow for consideration of other livelihoods which require more than one territory. Herders, in this sense, do not fit into this framework.

4.3.3. Conclusion

Extreme weather conditions, and unreliable climatic patterns have created unpleasant conditions for many people whose livelihoods are dependent on natural resources. As in the case of Mali, these climatic changes have reduced the availability of resources to an extent, disrupted the production calendars of different producer groups and led to competition among different communities, such as farmers and pastoralists. Livelihoods are strongly attached to the ethnic identity of individuals; hence, the Fulanis have become one of the main actors in this competition for land and water.

The French rule left a similar legacy in Burkina Faso, in which newly introduced land management systems have interrupted the existing customary systems, and favored agriculture production at the expense of pastoralism. The lifestyle of the Fulani was seen as an obstacle for modernization; hence, these new policies attempted to sedentarize pastoral communities. Those that did not adopt a sedentary lifestyle were pushed to marginal lands and excluded from the political considerations further.

Despite these factors - competition for resources, feelings of exclusion and injustice -Burkina Faso has maintained its low-conflict profile. Clashes among different producer groups could be observed every day; yet, these have not turned into violence conflicts. The case analysis of Burkina Faso suggests that political marginalization is not the answer to the question of why communal conflict has not been observed in the country. The elite role in Burkina Faso in unifying the society appears to be different than in Mali; however, there is not sufficient evidence to conclude that the role of the elite is the answer. The data that explicitly identifies the decisions of and steps taken by the elite simply does not exist. Based on the available data, one could find a correlation between the role of the elite in mobilizing its communities and the occurrence of violent clashes; yet, more information is needed to establish a causal relationship between the two.

4.4. Case Comparison: Mali and Burkina Faso

Mali and Burkina Faso share many similarities. Besides their geographical location, both countries were once part of the French empire, have politically marginalized Fulani ethnic groups, and are highly vulnerable to climate change due to their low development levels and heavy dependence on natural resources, such as land and water, for food security and economic opportunities.

The climate change vulnerability monitor provided by the HCSS (Figure 18) assesses countries' vulnerabilities to climate change. It incorporates three different dimensions in its calculation: vulnerability to weather-relates disasters; vulnerability to sea level rises; and vulnerability to loss of agricultural production (See Annex 3 and 4). Since both Mali and Burkina Faso are landlocked countries, sea level rise is not a primary concern for either of them. As such, inclusion of the sea level factor into the calculations does not significantly change the overall climate change vulnerability index for any one of these countries. There is a 0.03-point difference between the vulnerability of Mali and Burkina Faso. According to the monitor, Mali is slightly more vulnerable (0.16) to climate change than Burkina Faso (0.13). However, both countries are still considered to be highly vulnerable to changes in climate patterns – from extreme weather events, such as floods and droughts, to variations in rainfall and temperature.



Figure 18. Climate Change Vulnerability (Mali and Burkina Faso)

Source: Climate Change Vulnerability Monitor, The Hague Center for Strategic Studies (HCSS) (2017).

These two West African countries also suffer from low human development capacity assessed by the Human Development Report (HDR) by the UNDP (2016) (Figure 19). This assessment is developed using five key indicators: The Human Development Index (HDI); the Inequality-adjusted Human Development Index (IHDI); the Gender Development Index (GDI); the Gender Inequality Index (GII); and the Multidimensional Poverty Index (MPI) (UNDP 2016).¹⁰





Source: UNDP (2016).

Table 5 provides a comparison of these key indicators in Mali and Burkina Faso. As the table itself suggests, both countries are placed almost at the bottom of the of the UNDP's human development assessment, and the values assigned for each country are relatively close to one another.

Table 5. HDR Country Comparison

	HDR Rank	HDI Value	IHDI Value	GDI Value	GII Value	MPI Value
	(out of 188)					
Mali	175	0.442	0.293	n/a	0.689	0.456
Burkina Faso	185	0.402	0.267	n/a	0.615	0.508

Source: UNDP (2016).

¹⁰ See Annex 5 for country score for each indicator and their sub-values.

^{55 |} Climate Conflicts?

Furthermore, Mali and Burkina Faso heavily depend on the land to sustain livelihoods. Land and water resources are the primary sources for food security and economic opportunities for many communities. As briefly discussed earlier, over 80 of the total population in both countries engage in agricultural practices, including agriculture, fishing, hunting and forestry (World Bank Data 2015). These practices together contribute over 35 percent to the GDP of each country (Table 6).

	Total Population (in million)	Rural Population	Agricultural population (in % of total)	Population Density		Agricultural value added
				(People per km ²)	(Agr. pop. Per arable land* km ²)	
Mali	17,599.69	60	74	13	197	40.3
Burkina Faso	18,105.57	70	92	61.8	261	35.7

Table 6. Agricultural Production in Mali and Burkina Faso

* FAO defines arable land as "land under temporary crops, temporary meadows for moving or for pasture, land under market or kitchen gardens, and land temporarily fallow." Source: World Bank Data (2015); FAO. (¹ 2016 / ^{2,3,4,5,6,7} 2005)

These numbers signify the importance of the agricultural production for the survival of individuals and communities. They also explain the high vulnerability of Mali and Burkina Faso to climate change. The fertility of the soil in part depends on climatic patterns. Significant shifts in these patterns could have, and have had, detrimental impacts for agriculture and livestock production in these countries.

Moreover, the primary actor in the communal conflicts in Mali was the Fulani people. In all of these circumstances, they felt that their livelihoods were being threatened in part due to climate change, and in part due to political marginalization they have been exposed to. The Fulani communities have experienced similar dynamics in Burkina Faso as well. Although postcolonial governments attempted to incorporate the Fulani identity into the national identity, they disregarded the concerns and needs to the Fulani communities in the years after. As such, Fulani people have experienced political marginalization, which further exacerbated their vulnerability to changing climate patterns. Despite these common features, none of the factors able to sufficiently explain the lack of communal conflict in Burkina Faso. These features could in theory exacerbate the ongoing tensions within the society; however, within the scope of this study, they appear to have low significance for conflict dynamics. In the next section, I display my findings and explore the factors that might explain how communal conflicts could occur within the context of climate change.

4.5. Exploring the Truth: *Why No Communal Conflict in Burkina Faso?*

In an attempt the study the relationship between political marginalization and communal conflict within the context of climate change, my findings do not provide enough evidence neither to support my hypothesis, nor to reject it. The concept of political marginalization does not sufficiently explain the variation in the dependent variable in my cases.

Through my case analysis, I have discovered that all variables and mechanisms, except one, are present in both countries. In Burkina Faso, mobilization by the elite is not present as a mechanism. The role of the elite in Mali seems to contrast the attitude and the behavior of those in Burkina Faso. In both countries, the Fulani populations have been exposed to climate-driven environmental stress and political marginalization. In Mali, these dynamics were accompanied by competition for natural resources, feelings of injustice, and elite encouragement for mobilization. In the face of increasing vulnerability of the Fulani due to the climatic events and political decisions, Fulani elites were found to be encouraging their communities to gain the authority and respect they 'deserve'.

Burkina Faso, on the other hand, shares the same characteristics, except the role of the elite was different. Following the end of the colonial era, Burkinabe elites have focused on unifying the nation, as opposed to using the ethnic card to gain political support. The idea of nepotism was against the ideals of creating a strong national identity; thus, the elite avoided using ethnicity in political discussions.

Still, there is not enough evidence to confidently argue that the elite role is the key factor explaining the lack of communal conflict in Burkina Faso. This requires me to study other factors that might connect climate change and communal conflict. For this purpose, in the following section, I explore other potential factors that could explain the variation in the dependent variable.

4.5.1. Other Potential Factors

Identifying every potential conflict factor is a challenging task as these factors interact with other physical, social, political and economic dimensions in many ways. However, throughout my research, I was able to detect several factors that might provide some insight for why communal conflicts were not experienced in Burkina Faso. It is important to note that these additional factors should not be seen as definitive answers to the differences between Mali and Burkina Faso. Instead, they should be considered as areas to be explored further in future studies to better understand their implications for climate-conflict dynamics.

Interpersonal Trust

Interpersonal trust is a form of social capital. Such a trust could lay the foundation for civilian agency, which could influence individuals' attitude towards violence, and "lead to actions that mitigate and restrain violent" in the context of tension (Krause 2016:282). Measuring this trust is not an easy task as groups might portray different images within the public and non-public contexts. However, personal accounts could display how interpersonal trust plays out in avoiding violence.

The interpersonal trust between the Fulani and other groups are different in Mali and Burkina Faso. In Mali, Fulani people perceive themselves as victims and "see taking up modern weapons as a way to challenge existing hierarchies, and to contest the privileges of urban elites and traditional local aristocracies" (International Crisis Group 2016, para.2). In fact, Fulani people believe that racism is still strong in Mali and Fulanis are seen as a category apart" (Botte and Schmitz 1994, in International Crisis Group 2016, para.20). As such, some elites believe that the Fulani should stand up for their rights with whatever means necessary.

Farmers, on the other hand, do not trust the Fulani because of their perceived affiliation with the radical militant groups. Although Fulani public figures have been emphasizing that Fulani people are not terrorists, the Fulanis have become increasingly aware of the implication of their ethnic identity. Additionally, farmers generally feel that they are continuously being wronged by the Fulani. Fulani people never take the responsibility for damaging the crops, yet alone compensate farmers for it. For instance, an elderly farmer from the central region of Mali once stated: "you can know a Fulani [herder] for one hundred years and he still will not pay you if he damages your crops" (Brottem 2016: 553). Another farmer also experienced crop loss due to damages caused by a herder, whom was hosted by the family for over 25 years. Despite he acknowledged his fault, he still failed to compensate the family. According to several farmers, it is for this reason that they are "unwilling to accommodate herders' access needs to changing resources" (Brottem 2016:553).

In Burkina Faso, however, the picture is different. The interpersonal trust between the Fulanis and farmers seems stronger and their relationship appears to be more cooperative - only

within *non-public* discourse. Especially, the relationship between Fulanis and Mossi farmers, the largest ethnic group in Burkina Faso, can be seen as an example of this bond. These two groups have an "institutionalized friendship relations" known as *zoodo* (Breusers et al. 1998:368). Mossi is known for entrusting their cattle to Fulani. While cattle are an important element of this bond, the trust between Fulani and Mossi extends "beyond the domain of cattle and …purely economic exchanges" (Breusers et al. 1998:369). Inter-marriages between the two groups can often be found in Burkina Faso.

However, these practices of trust take place *privately*. In their publicly employed discourse, Mossi farmers say and do what their identity requires – cropping millet and denigrating the Fulani – to "show a common front" with their community (Breusers et al. 1998:370). Those that share '*zoodo*' with the Fulani, still depict Fulani people "as not to be trusted, likely to be thieves, physically weak, disrespectful of any authority and uncivilized people of the bush" (Breusers et al. 1998:369). Some even go as far as to say: "it would be better to eat your money than to entrust your cow you bought to a [Fulani], as there will always come a moment when the [Fulani] comes to tell you that your cow is dead" (Breusers et al. 1998:369). This dichotomy in the attitude and behavior of the Mossi indeed shows the "externalization of tensions internal to the Mossi community" (Kirwin 2010:35). Among the Mossi, cattle ownership is an indicator of one's wealth. Those that can afford cattle feel the need to hide their assets from their fellow villagers to prevent being "cursed" by them (Breusers et al. 1998:370). Thus, the interaction between the two groups observed in public domains does not speak for the nature of their bond. As one villager indicated:

"We Mossi and Fulbe, do insult one another, harshly even, but each knows of the other that these are only false insults, only [a theatre]. In reality, we do understand one another very well. The insults serve to avoid arousing suspicion with the others" (a Mossi cited in Breusers et al. 1998:370).

The existence of such a bond between Mossi and Fulani does not suggest that there are no conflicts. Climate change has impacted the natural resources that both groups depend on for survival, and Fulani still experience political marginalization in Burkina Faso. However, the

significance of this interpersonal trust between the two ethnically different producer groups is that it might play a role in influencing people's perception towards violence and their participation in violent clashes with one another.

Associational Life

Associational life can be considered as another form of social capital and it is frequently referred to in discussions about violent conflict mitigation. In his research in India, Varshney (2001) concludes that "everyday engagement between individuals and face to face interaction is sufficient to preclude the outbreak of violent conflict (pp.392). Similarly, Brass (1997) suggests that violent conflict could be prevented by engaging in extra-communal relations.

In Burkina Faso, especially Fulani women and women from farming communities share a strong economic relationship, which is reinforced through market activities, informal exchanges of goods and services, and celebrations (Hagberg 1998). Groups that do have inter-ethnic relations within social, economic and religious domains could and still do come into conflict with each other (Hagberg 1998). However, such clash does not turn into a violent conflict because the social capital, built upon associational life and interpersonal trust, outweighs the ethnic hostility.

In Mali, on the other hand, this appears to be the other way around. Beeler (2006) finds that "in-group social capital (Dogon and Dogon) helps resolve conflicts, [while] out-group (Dogon and Fulani) social capital is trumped by ethnicity" (in Kirwin 2010:88). As a result, a farmer does not tolerate a damage done by a Fulani, despite having personal relations with that individual. Meanwhile, damage caused by an individual from the same ethnic group does not lead to an escalation due to the shared ethnic bond and linkages.

Both associational life and interpersonal trust are cited for their potential for mitigating conflicts among different groups. A field work conducted in Burkina Faso by Kirwin (2010) finds that both forms of social capital have shown "diminishing effect on an individual' support for violence" (pp.164). This is insightful as it offers additional potential explanations for the different dynamics in the country. However, in order to confidently conclude that associational life is significant for conflict mitigation, more in-depth research is needed in both of these countries.

Sense of National Unity

In societies that are composed of diverse race, religion and ethnicities, it is common to see the "placement of certain groups into the category of the 'other'" (Brewer 2001:17). Such categorization makes 'the other' "vulnerable to varying degrees of distrust, prejudice, hatred, and demonization," which makes their exclusion "from one's own moral community" easier (Kelman 2005, para.1). This moral exclusion then facilitates the "social and economic discrimination" of 'the other' (Kelman 2005, para.1). While there could be many reasons for such a categorization, the key component remains as the "perception of the out-group as a threat to one's own group's interests, status, or identity" (Kelman 2001:192-193).

In order to minimize violent conflicts from occurring and to offer opportunities for reconciliation, these diverse identities within the society need to be harmonized. As discussed earlier, there was an attempt to create a unified national identity in Burkina Faso. During his presidency, Thomas Sankara (1983-1987), changed the demonym for the country from *Voltaique* to *Burkinabe* to symbolize a new beginning for his country. This was seen necessary to create a strong national identity and a sense of unity among the people. The new name, *Burkinabe*, was constructed very carefully to ensure that it was gender-neutral and represented different ethnic groups, including the Fulani. The *be* at the end represents the Fulani identity – as in Ful*be* (Kuba 2003).

Mali, on the other hand, had a different approach in creating a unified national identity. Following its independence in 1960, the first president Modibo Keita changed the name of the country from the Mali Federation to the Republic of Mali (Lecocq 2010). The former failed to create a strong national identity, so the latter meant to "forge a sense of national unity around southern Mali's proudest moments" (Smith 2014:11). However, this was not a successful attempt. Instead of unifying differences, it has magnified divisions within the society. The new name meant that "the Malinke, the Bambara and other Mande ethnic groups were 'true Malians', who must be favored over all other ethnic groups within the state" (Smith 2014:11-12). This line of reasoning suggested that all the other ethnic groups were considered to be "holding a lower status" within the social and political segments of the government; thus, did not deserve to have "resources, political power and respect" (Smith 2014:12).

The construction of identities is a social process, and it suggests "a degree of arbitrariness and flexibility in the way [it] is composed ... and in what its boundaries are" (Kelman 2005:4).

These decisions and choices reflect the interests of the political elites. This could be seen as a form of elite manipulation, which is conceptually different than what I referred to earlier. In the cases of Mali and Burkina Faso, it is apparent that the post-colonial governments had different visions regarding to what a nationally unified identity entails. The implications of such choices might be that in societies that share a strong national identity, violent conflicts may not be welcomed. However, in order to fully understand if, and to what extent, national identity may change people's attitude and behavior towards violence, conducting interviews, survey and participant observation in these two countries might be necessary.

History of Conflict

Within the conflict and security studies, the legacy of conflict is often considered as a root cause for intractable conflicts (Coleman 2003). These intractable conflicts almost exclusively refer to conflicts taking place on the national level; however, this argument should not be fully dismissed for sub-national conflict dynamics. Mali was once known as the "model of democracy, a growing center for the arts and the study of African history," but the ongoing challenges of secessionism and military coups have "plunged the country into chaos" (Chilson 2012: para.4). There are two long-term historical issues that explain the instability in Mali: "the history of the Tuareg [pastoralists], and the history of militant Islam in the region" (Keys 2013:1).

Since before the colonial era, there has been a strong tension between Tuareg people and the agricultural population residing in southern Mali. These two groups share "different origins and political aspirations;" yet, they are bound to live within the same borders due to the decisions of the French regime (Keys 2013:2). Until the final years of the colonial rule, the French did not see any value in economically investing into Tuareg people, their livelihoods and territories. Thus, Tuaregs were given local autonomy; while the south was 'encouraged' to "fully embrace the French political and cultural norms" (Keys 2013:2). Through this autonomy, the Tuareg were able to reject being assimilated into the French system. Unfortunately, this also meant that they were not able to "resist union with the south" following independence, as they lacked the economic and administrative skills to hold power (Chauzal and van Damme 2015:18). As of mid-1950s, the French came to realize that the Tuareg desert might be gifted with natural resources such as gas, oil and uranium; thus, it attempted to retain its authority over the region

and promised the Tuareg for a Tuareg-dominated super state. However, this idea was heavily challenged by the south, and neither the French nor the Tuareg could have what they wanted (Chauzal and van Damme 2015).

Militant Islam, on the other hand, has been heavily present in Mali especially since the 1990s. The drought during the 1970s had forced thousands of Tuaregs to migrate to Algeria and Libya. In Algeria, these refugees were exposed to political ideals of independence for Berbers (Tuaregs are from Berber descent). In Libya, they were recruited by Ghaddafi to serve in his army and equipped with weapons. Upon their return to Mali, Tuaregs were influenced by two events. First, the Algerian civil war (1991-2002) created a "tradition of armed Islamist insurrection," which captured the attention of many Tuaregs (Keys 2013:3). Secondly, some of them were influenced by a "very conservative, though non-Islamist, Pakistani Muslim 'missionaries,' who were present in the northern part of the country (Keys 2013:3). Furthermore, a number of Islamists in the region were inspired by the idea of re-establishing Muslim theocratic states. The combination of the secessionist ideals of Tuaregs and their Islamist ambitions, together with the availability of weapons, have resulted in multiple rebellions and laid the foundation of Mali's instability.

Burkina Faso has also had its own problems. The country has seen many demonstrations over poor paying conditions, high costs of living, and corruption. However, the government committed to "strengthening of democracy" and took concrete steps to address the issues brought forward by its citizens. Despite struggling with its own issues, Burkina Faso has managed to "retain its image as a small island of stability in a region plagued by drought and war" (Chilson 2012: para.19).

As discussed earlier, although the legacy of conflict argument has often focused on civil conflicts, it might provide opportunities to unpack some of the dynamics on the communal level. In the case of Mali, one of the reason for why farmers do not trust the Fulani is because their 'perceived association with the religious militants,' which has been a concern on the national level. This suggests that such a history of conflict could have implications for local clashes among ethnically different land user groups.

Social Local Institutions

Natural resources such as land and water are fundamental for both farmers and herders to maintain their livelihoods. As such, local institutions are significantly important for managing the usage of these resources, "shaping people's adaptive capacities" in the face of changing landscape, and mitigating tensions between different groups (Crane 2013:14). This is in line with the 'common property resources' (CPR) debate, which highlights the importance of community management for resource access and allocation (Hussein 1998). Areas without CPR management systems, or with ineffective ones, are more likely to experience violent conflicts.

Since the colonial era in Mali, the institutional and customary practices of land tenure have transformed substantially. Until the late 1980s, Mali had a strong centralized government, which empowered civil servants to control the society. In the 1970s, rural communities were recognized as administrative units, "followed by statutory provision for rural organizations (*Tons villageois*) in 1985 (Hesseling 1996:33). However, these organizations lacked the "autonomous legal status;" instead, they were regarded as "merely intermediaries for the implementation of centrally formulated development programs" (Moorehead 1992L109). Despite the introduction of new laws, neither the French nor post-colonial regimes were able to fully eradicate the existing customary practices. As a result, there was a "legal chaos ... with respect to land and natural resources" (Hesseling 1996:34). This "coexistence and interaction of multiple legal orders" have weakened the capacity of and people's confidence in local institutions in mitigating conflicts (Meinzen-Dick and Pradhan 2001, in Brottem 2013:72).

After the revolution in 1991, the interim government prepared new policy recommendations for the incoming regime to address land tenure and environmental issues. However, the implementation of these recommendations was not successful due to the legislation's "instrumentalist and positivist approach" towards creating a change (Hesseling 1996:36). Malian government has referred to the law "as an instrument of social change" in the sense that legislation "is meant to adapt the behavior of citizens and make it consistent with the law" (Hesseling 1996:36). This approach has disregarded the "complex web of reciprocal relationships and social fields" on the local level, and led to conflict between state and customary law.

Until recently, similar issues could have been observed in Burkina Faso as well. The presence of state laws and customary practices often contradicted each other at the local level,

and increased the contesting claims among different land users. However, in 2009, the national government passed the Rural Land Tenure Law to address this ongoing issue. The law has been recognized as "one of the most innovative pieces of rural land legislation in West Africa" (Focus on Land n.d., para:5). In contrast to other African governments' attempts of decentralization, land management under the Rural Land Tenure Law is indeed decentralized and customary rights at the local levels are recognized. The new law "facilitates legal recognition of individual and collective rights, inheritance through and certificates, land leases, and local land management institutions" (Focus on Land n.d., para:5). Furthermore, in areas where customary authority is no longer present, this new law attempts to "restore local management through the introduction of local rural land charters" (Focus on Land n.d., para:6).

These are important developments but this focus on the local institutions needs to be approached with caution. The developments in Burkina Faso, regarding to the land management and recognition of customary practices could serve as effective mechanisms to mitigate conflict among different land users. Yet, these are considerably new developments. Prior to the Rural Land Tenure Law, the land was managed in a similar fashion as in Mali. As such, it is important to note that the discussions over local institutions in Burkina Faso might not be able to offer a strong explanation for why Burkina Faso has not experienced communal conflicts to this point. However, the establishment of this new law might prove to be a valuable mitigating mechanism for future conflict dynamics.

4.5.2. Conclusion

These additional factors should not be seen as an exhaustive list. The intention of exploring other potential issues is to highlight that the relationship between climate change and communal conflict is indeed more complicating than initially assumed. This research confirms Brottem's (2013) statement that "it is exceedingly difficult to pinpoint the exact causal relationship between environmental change, human response and social conflict" (pp.20). Such a relationship does not always have a linear pattern, but a complex and interlinked one.

Moreover, these factors are not necessarily to be treated independently. For instance, social local institutions could provide a platform to establish interpersonal trust among different groups, which may then flourish associational life. On the other hand, the existence of social capital could pave the way for the establishment of information local institutions which could
oversee land-related issues. The issue of exclusion from the formulation of national identity could also be seen as an indicator of political marginalization. There are so many different ways for how climate change could be linked to violent conflicts at the local level. It is for this reason important to understand how different factors interact with one another when studying the relationship between multiple phenomena.

5. Conclusion

5.1. Main Findings

The primary intention of conducting this research was to understand the dynamics that connect climate change and conflict on the local level. The significance of climate change for peace and security discourses is being acknowledged at an increasing rate; however, how exactly climate change is a concern for conflict is highly contested. Lack of data, selection biases and different interpretations are some of the reasons for this lack of consensus.

Studies to date have primarily focused on the implications of climate change on the national level. This may have been the case due to the convenience and availability of national data. While these studies present valuable findings, they disregard the events taking place on the sub-national level. One of the agreements within the climate-security discussions is that climate change means different things, has different implications for different people and different locations. This is simply because the idea of vulnerability is not static; rather, it is shaped by "a host of complex social and economic factors, often associated with entitlements and access of individuals or groups to resources relative to the context in which these individuals, or groups sit" (Rance and Funfgeld 2014:8). Therefore, it is crucial for the international community to understand these local dynamics, as only then we can better assess how climate change impacts individuals, societies and nations.

To address this need, I studied the relationship between climate change and conflict on the sub-national level, with a particular focus on different land users – e.g. farmers and herders. Since climate change acts as a threat-multiplier, I relied on two different theoretical frameworks – environmental security and horizontal inequality – to understand under what factors climate-driven environmental stress leads to communal conflict. Instead of testing several factors, I focused on only one factor – political marginalization – and tested the following hypothesis 'climate-induced environmental stress leads to communal conflict when some social groups are politically marginalized' in Mali and Burkina Faso.

My findings suggest that there is not sufficient evidence neither to support my hypothesis, nor to reject it. While the impacts of climate change in exacerbating existing vulnerabilities is clearly displayed, the concept of political marginalization does not sufficiently explain the variation in the dependent variable in my cases. As discussed earlier, other factors such as the role of the elite, social capital, conflict legacy, sense of national unity, and local institutions might be able to provide more insight for the relationship between climate change and communal conflict. It is important to note that exploring other factors does not necessarily require dismissing political marginalization all together. Political marginalization might not lead to communal conflict within the context of climate change alone, but it may do so by interacting with other factors.

5.2. Research Limitations

The primary limitation to this research has been the lack of data on the local level. The inability to conduct a field research required me to rely on the existing data for information and contextual knowledge. However, detailed analysis of the conflicts, and the role played by the elites and local organizations in specific locations were not available in the existing literature. These have prevented me from conducted an adequate process-tracing, considerably limited the scope of my research, and affected my findings. The data was further limited by the fact that several documents were only available in French. Although I was able to translate certain information, I was not able to access to all of them.

The second limitation to this research is the methodology of choice – small-*N* case study. This approach is the most appropriate when conducting process-tracing due to its high internal validity. However, it also means that small-*N* studies have a low external validity (George and Bennett 2005:25). Another limitation relates to my research design, MSSD, and my case selection for the small-*N* case study. I chose two cases in which the outcome of interest, communal conflict, was different. The intention behind this decision was to avoid committing a selection bias, which is common within the literature on climate change and conflict. However, it is possible that I might have still committed a selection bias by selecting cases that have a variation in the dependent variable. After all, "selecting cases so that there is a variation in the dependent variable is still selecting cases on the dependent variable" (Halperin and Heath 2012:217).

The final limitation to this study considers the operationalization of dependent variable. I operationalized communal conflict as a 'conflict on the sub-national level, involving informally organized groups, who use any material means as arms, and causing at least 25 battle-related deaths. The decision to operationalize communal conflict this way was due to the availability of

the data. However, the minimum threshold of 25-battle related deaths required me to exclude other conflicts that might have provided valuable insight for this research.

5.3. Shortcomings and Recommendations for Future Research

In addition to the discussed limitations, there are two main shortcomings to this research. First, political marginalization can mean many things. Within the framework of horizontal inequalities, it could be assessed by indicators involving "the control over the presidency, the cabinet, parliamentary assemblies, the bureaucracy, local and regional governments, the army and the police" (Stewart 2009:5). In other studies, political marginalization could refer to "low political interest and low political trust" (Oskarson 2010:9; Andersen 2001). In this research, I conceptualized political marginalization using only two indicators, which limited the scope of the concept. It is possible that the inconclusiveness of my findings might be in part due to how the concept was conceptualized and operationalized in this study. Thus, discussions over political marginalization should still be included in future conflict research, and its operationalization should be done with caution.

The second major shortcoming relates to the role of the elite in mobilizing its constituencies. Several studies (Vashney 2002; Posner 2005; Brottem 2013) have recognized the role of the elite for political stability. This research finds that the role of the elite in affecting the behavior of its people could offer some explanation for the presence of communal conflict in Mali; however, this link is not strong enough. While there is some evidence that in Mopti region, Fulani elites had been trying to mobilize their people, it is not certain how they manipulated their people and to what extent these forces played a role in the individually assessed conflicts. As such, the potential role of the elite mobilization in Mali's communal conflicts is not based on evidence, but an assumption.

Additionally, the role of the elite in unifying different ethnic groups in Burkina Faso remains unclear. Discussions that focus on the low-conflict profile of Burkina Faso make a reference to the elites' attitude in avoiding the use of ethnic card as a potential explanation (Kirwin 2010); however, they fail to provide a causal relationship. This is an area that requires much more attention and in-depth research. Moreover, I categorized the mobilization by the elite as a mechanism that would connect political marginalization and communal conflict within the context of climate change. In order to study the potential relationship between the role of the elite and the variation in the dependent variable, it might be more appropriate to treat it as an intervening, or independent, variable.

This research does not produce as conclusive results as I expected. Yet, it provides several opportunities for future research. The overarching focus of the study, climate change and conflict, is highly relevant for the present day global security issues, and its significance will only grow in the years to come. My focus also acknowledges a gap within the existing literature which requires urgent attention. In this sense, this research should be considered as a first step in the direction of better understanding the implications of climate change at the local level. I have offered several factors that could shed some light for the climate-conflict relationship, but more detailed analysis is needed.

Secondly, the research at hand recognizes the need to approach this topic using different theoretical frameworks. The implications of climate change on societies can only be fully understood by studying its interaction with other social, political and economic circumstances. Incorporating different theoretical frameworks could allow us to discover new connections between different factors that might have been overlooked before. Moreover, I believe that the simple recognition of the role of the climate change as a threat multiplier, requires the incorporation of other theoreties into the climate-conflict discussions.

As Al Gore once said: "*The climate crisis is the greatest challenge humanity has ever faced. The climate crisis will affect everything that we love and alter the course of our future*" (2013). It is for this reason we, as the international community, must do everything within our power to fully comprehend the effects of climate change and to develop appropriate measures to protect ourselves from loss, pain and suffering. Not only we owe to this ourselves, but we owe it to the future generations.

Bibliography

- Abdulai, A. and CroleRees, A. (2001). "Determinants of income diversification amongst rural households in Southern Mali." *Food Policy*, 26:437-452.
- Adger, W.N. et al. (2014). "Chapter 12: Human Security." In Climate Change 2014: Impacts, Adaptation, and Vulnerability. Working Group II Contribution to the IPCC Fifth Assessment Report.
- Adger, W.N. (2006). "Vulnerability." Global Environmental Change, 16:268-281.
- Anadolu Agency (AA) News (2016). "More than 30 killed in intercommunal clashes in Mali." Available at: <u>http://aa.com.tr/en/world/more-than-30-killed-in-intercommunal-clashes-in-mali/567477</u> [Accessed on 17 April 2017]
- Battenbury, S. (1998). "Local Environmental Management, Land Degradation and the 'Gestion des Terroirs Approach in West Africa: policies and pitfalls." *Journal of International Development*, 10:871-898.
- Barnett, J., and Adger, W.N. (2007). "Climate change, human security and violent conflict." *Political Geography* 26:639-655.
- BBC News (2004). "Global warming 'biggest threat". *BBC News: Science and Environment*. Available at: <u>http://news.bbc.co.uk/2/hi/science/nature/3381425.stm</u>
- BBC News (1999). "Several reported killed in Mali fighting." *World: Africa* (October 18). Available at: <u>http://news.bbc.co.uk/2/hi/africa/478496.stm</u> [Accessed on 23 April 2017]
- Benjaminsen, T.A. et al. (2012). "Does climate change drive land-use conflicts in the Sahel?" *Journal of Peace Research*, 49(1):97-111.
- Benjaminsen, T.A. and Ba, B. (2009). "Farmer-herder conflicts, pastoral marginalization and corruption: A case study from the inland Niger delta of Mali." *Geographical Journal*, 174(1):71-81.
- Benjaminsen, T.A., Maganga, F. and Abdallah, J. M. (2009). "The Kilosa killings: Political ecology of a farmer-herder conflict in Tanzania." *Development and Change*, 40(3):423-445.
- Blench, R. (2003). "The transformation of conflict between pastoralists and cultivators in Nigeria." Paper in press for a special issue of the Journal Africa, ed. M. Moritz. Available at: <u>http://www.rogerblench.info/Conflict/Herder-</u> <u>farmer%20conflict%20in%20Nigeria.pdf</u> [Accessed on 1 April 2017]

- Bob, U., Bronkhorst, S. and Sala, S. "Climate change and conflict: Conflict-sensitive climate change adaptation in Africa." In Urmilla, Bob and Salome Bronkhorst (eds.) Conflictsensitive adaptation to climate change in Africa. Berliner Wissenschafts-Verlag (BWV): Berlin, Germany. (2014):27-54.
- Botte, R. and Schmitz, J. (1994). "L'archipel peul." *Cahiers d'etudes africaines: Speical Edition,* 34(133).
- Brass, P. (1997). *Theft of an Idol: Text and Context in the Representation of Collective Violence*. Princeton, NJ: Princeton University Press.
- Breusers, M. (2003). "Identite et mobilite: la dynamique des droits fonciers et la poursuite d'une securite de subsistence dans la province du Sanmatenga, Burkina Faso. In: Kuba, R., C. Lentz and N. C. Somda (eds.). Histoire du peuplement et relations interethniques au Burkina Faso. (pp.41-58). Paris:Karthala.
- Breusers, M., Nederlof, S. and van Rheenen, T. (1998). "Conflict of Symbiosis? Disentangling Farmer-Herdsman Relations: The Mossi and Fulbe of the Central Plateau, Burkina Faso." *The Journal of Modern African Studies*, 36(3):357-380.
- Brewer, M.B. (2001). "Ingroup Identification and Intergroup Conflict: When Does Ingroup Love Become Outgroup Hate?" In Ashmore, R.D., L. Jussim and D. Wilder (eds.) Social Identity, Intergroup Conflict, and Conflict Reduction. Oxford and New York: Oxford University Press. (pp.17-41).
- Brooks, N. (2006). "Climate change, drought and pastoralism in the Sahel." Discussion note for the World Initiative on Sustainable Pastoralism. Available at: <u>https://cmsdata.iucn.org/downloads/e_conference_discussion_note_for_the_world_initiat</u> <u>ive_on_sustainable_pastoralism_.pdf</u> [Accessed on 2 April 2017]
- Brooks, N., Adger, W.N., and Kelly, P.M. (2005). "The determinant of vulnerability and adaptive capacity at the national level and the implications for adaptation." *Global Environmental Change*, *15*(2):151-163.
- Brottem, L.V. (2016). "Environmental Change and Farmer-Herder Conflict in Agro-Pastoral West Africa." *Human Ecology*, 44:547-563.
- Brottem, L.V. (2013). "The Place of the Fula: Intersections of political and environmental change in western Mali." PhD Dissertation. University of Wisconsin-Madison.
- Brown, Oli, Hammill, A. and McLeman, R. (2007). "Climate Change as the 'New' Security Threat: Implications for Africa." *International Affairs (Royal Institute of International Affairs 1944-) 83*(6), Africa and Security, pp.1141-1154.

- Bruijn, P. de, van Beek, W. and van Dijk, H. (n.d.). "De betrekkingen tussen Peul en Dogon in Centraal-Mali." Available at: <u>https://openaccess.leidenuniv.nl/bitstream/handle/1887/9697/ASC_1268914_031.pdf?seq</u> <u>uence=1</u> [Accessed on 24 April 2017]
- Buhaug, H. (2015). "Climate-conflict research: some reflections on the way forward." WIREs Climate Change, 6:269-275.
- Buhaug, H. (2010). "Climate not to blame for African civil wars." *Proceedings of the National Academy Sciences*, 107(38):16477-16482.
- Burke, M.B., et al. (2009). "Warming increases the risk of civil war in Africa." *Proceedings of the National Academy of Sciences, 106*(49):20670-20674.
- Busby, J.W., Smith, T.G., and Krishnan, N. (2014). "Climate security vulnerability in Africa mapping 3.0." *Political Geography*, 43:51-67.
- Butt, T.A. et al. (2005). "The Economic and Food Security Implications of Climate Change in Mali." *Climate Change*, 68:355-378.
- Carvalho, G. and Rozen, J. (2016). "Climate change and conflict: how Mali can grow more resilient: Addressing the relationship between drought and violence in Mali cannot rely on traditional crisis responses." *Institute for Security Studies (ISS), ISS Today*. Available at: <u>https://issafrica.org/iss-today/climate-change-and-conflict-how-mali-can-grow-moreresilient</u> [Accessed on 18 April 2017]
- Cederman, L.E. and Gleditsch, K.S. (2009). "Introduction to special issue on 'disaggregating civil war'." *Journal of Conflict Resolution*, *53*(4):487-495.
- Central Intelligence Agency (CIA) (217). *The World Factbook*. Available at: <u>https://www.cia.gov/library/publications/the-world-factbook/geos/ml.html</u> [Accessed on 7 April 2017]
- Chauzal, G. and van Damme, T. (2015). "The roots of Mali's Conflict: Moving beyond the 2012 crisis." *Conflict Research Unit (CRU), Clingendael Institute*. Available at: <u>https://www.clingendael.nl/pub/2015/the_roots_of_malis_conflict/</u> [Accessed on 25 February 2017]
- Chilson, P. (2012). "Burkina Faso: A Small West African Country Struggles to Bring Peace to Mali." Story for the Pulitzer Center. Available at: <u>http://pulitzercenter.org/reporting/burkina-faso-small-west-african-country-strugglesbring-peace-mali</u> [Accessed on 14 May 2017]
- Climate Change Knowledge Portal. Country Dashboard: Mali. The World Bank Group. Available at:

http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode= MLI&ThisTab=Overview [Accessed on 18 February 2017]

- Climate Change Knowledge Portal. Country Dashboard: Burkina Faso. The World Bank Group. Available at: <u>http://sdwebx.worldbank.org/climateportal/countryprofile/home.cfm?page=country_profile&CCode=BFA&ThisTab=Overview</u> [Accessed on 28 April 2017]
- Coleman, P.T. (2003). "Characteristics of protracted, intractable conflict: Toward the development of a metaframework-I. Peace and Conflict: *Journal of Peace Psychology*, *9*(1):1-37.
- Collier, D. et al. (2004). "Sources of Leverage in Causal Inference: Toward an Alternative View of Methodology." Chapter 13 in Brady, H.E. and D. Collier (eds.) *Rethinking Social Inquiry: Diverse Tools and Shared Standards*. Lanham, MD: Rowman and Littlefield.
- Cotula, L. (eds.) (2007). *Changes in "customary" land tenure systems in Africa*. IIED Russell Press and FAO. Available at: <u>http://pubs.iied.org/pdfs/12537IIED.pdf</u> [Accessed on 18 May 2017]
- Coulibaly, A. (2017). Country Pasture/Forage Resource Profiles: Mali. Food and Agriculture Organization of the United Nations (FAO). Available at: <u>http://www.fao.org/ag/agp/agpc/doc/counprof/Mali/mali.htm</u> [Accessed on 28 April 2017]
- Crane, T.A. (2013). "The Role of Local Institutions in Adaptive Processes to Climate Variability: The cases of southern Ethiopia and southern Mali." *Oxfam Research Report*. Available at: <u>https://www.oxfam.org/sites/www.oxfam.org/files/rr-local-institutions-adaptive-climate-ethiopia-mali-080213-en.pdf</u> [Accessed on 14 May 2017]
- Daily Sabah News (2017). "Dozen dead in clashes between Mali herders, farmers fueled by ethnic strife." Available at: <u>https://www.dailysabah.com/africa/2017/02/13/dozens-dead-in-clashes-between-mali-herders-farmers-fueled-by-ethnic-strife</u> [Accessed on 17 April 2017]
- De Bruijn, M. (2005). *Rapports Interethniques et Identite: L'Exemple des Pasteurs Peuls et des Cultivateurs Humbeene au Mali Central.* In Y. Diallo & G. Schlee (eds). L'ethnicite peule dans des contested nouveaux. Paris: Karthala: 15-37.
- Deutsch, M. (1973). *The resolution of conflict: Constructive and destructive processes*. New Haven, CT: Yale University Press.
- Diallo, Y. (2008). Nomades des Espaces Interstitiels: Pastoralism, Identite, Migrations (Burkina Faso Cote d'Ivoire). Cologne: Rudiger Koppe Verlag.

- Douglas-Bowers, D. (2013). "The Crisis in Mali: A Historical Perspective on the Tuareg People." Global Research: Center for Research on Globalization. Available at: <u>http://www.globalresearch.ca/the-crisis-in-mali-a-historical-perspective-on-the-tuareg-people/5321407</u> [Accessed on 11 May 2017]
- Douny, L. (2016). *Living in a Landscape of Scarcity: Materiality and Cosmology in West Africa*. New York, USA: Routledge.
- Earth and Environmental Science (E&ES), Department. "Climate Change Profile: Mali." Leuven University, and Netherlands Commission for Environmental Assessment: Dutch Sustainability Unit. Available at: <u>https://ees.kuleuven.be/klimos/toolkit/documents/690_CC_mali.pdf</u> [Accessed on 1 May 2017]
- ECC Platform (n.d.). Climate change, fragility and conflict in northern Mali. Available at: <u>https://library.ecc-platform.org/conflicts/climatic-change-fragility-and-conflict-northern-mali</u> [Accessed on 23 April 2017]
- Elfversson, E. and Brosche, J. (2012). "Communal conflict, civil war, and the state: Complexities, connections, and the case of Sudan." *The African Centre for the Constructive Resolution of Disputes (ACCORD)*. Available at: <u>http://www.accord.org.za/ajcr-issues/%EF%BF%BCcommunal-conflict-civil-war-and-the-state/</u> [Accessed on 20 March 2017]
- Field, C. et al. (2012). *Managing the risks of extreme events and disasters to advance climate change adaptation*. Special Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.
- Fjelde, H. and von Uexkull, N. (2012). "Climate triggers: Rainfall anomalies, vulnerability and communal conflict in Sub-Saharan Africa." *Political Geography*, *31*:444-453.
- Focus on Land. (n.d.). "Land Rights and Development in Burkina Faso." *Land on Focus: Africa*. Available at: <u>http://www.focusonland.com/countries/burkina-faso/</u> [Accessed on 14 May 2017]
- Food and Agriculture Organization of the United Nations (FAO). FAO Country Profiles: CountrySTAT. Available at: <u>http://www.fao.org/countryprofiles/en/</u> [Accessed on 17 April 2017]
- Food and Agriculture Organization of the United Nations (FAO) (2012). Potential Impacts of Climate Change on Food Security in Mali. Available at: <u>http://www.fao.org/docrep/016/i2856e/i2856e.pdf</u> [Accessed on 24 April 2017]

- Frantz, C. (1075). "Pastoral Societies, Stratification, and National Integration in Africa." The Scandinavian Institute of African Studies Research Report 30. Uppsala: Uppsala Offset Centre.
- Gaines, S., Aaronson, S.A., and Abouharb, R. (n.d.). "Repression, Civil Conflict, and Leadership Tenure: A Case Study of Mali." A project produced by the UCL Political Science Department, and sponsored by the U.S. Army Research Office. Available at: <u>https://www.ucl.ac.uk/political-science/research/projects/conflict-</u> <u>repression/downloads/Mali_Case_Study.pdf</u> [Accessed on 18 May 2017]
- Gleditsch, N.P. et al. (2002). UCDP/PRIO Armed Conflict Dataset Codebook. Version 4-2009. Available at: <u>https://www.prio.org/Global/upload/CSCW/Data/UCDP/2009/Codebook_UCDP_PRIO</u> <u>%20Armed%20Conflict%20Dataset%20v4_2009.pdf</u> [Accessed on 12 May 2017]
- Gemenne, F., Barnett, J., Adger, W.N., and Dabelko, G.D. (2014). "Climate and security: evidence, emerging risks, and a new agenda." *Climatic Change*, *123*(1):1-9.
- Giannini, A. et al. (2017). "Climate risk and food security in Mali: A historical perspective on adaptation." *Earth's Future*, 5(2):144-157. Available at: <u>http://onlinelibrary.wiley.com/doi/10.1002/2016EF000404/pdf</u> [Accessed on 25 April 2017]
- Gurr, T.R. (1993). "Why Minorities Rebel: A Global Analysis of Communal Mobilization and Conflict Since 1945." *International Political Science Review*, 14:161-201.
- Hagberg, S. (1998). "Between Justice and Peace: Dispute Settlement Between Karaboro Agriculturalists and Fulbe Agro-pastoralists in Burkina Faso." Uppsala: Acta Universitatis Upsaliensis.
- Halperin, S. and Health, O. (2012). Political Research: Methods and Practical Skills. Oxford: Oxford University Press.
- Hamro-Drotz, D. (2014). "Livelihood security: Climate change, migration and conflict in the Sahel." In Bob, U. and Salome Bronkhorst (eds.) Conflict-sensitive adaptation to climate change in Africa. Berlin, Germany: BWV.
- Handmer, J., Honda, Y., Kundzewicz, Z., Arnell, N., Benito, G., Hatfield, J., et al. (2012).
 "Changes in impacts of climate extremes: human systems and ecosystems." In C. Field, V. Barros, T. Stocker, and Q. Dahe (eds.) *Managing the risks of extreme evets and disasters to advance climate change adaptation*. New York, USA: Cambridge University Press. pp. 231-290.

- Heinrigs, P. (2010). "Security Implications of Climate Change in the Sahel Region: Policy Considerations." For Security implications of climate change in the Sahel (SICCS). By The OECD's Sahel and West Africa Club Secretariat, the French Ministry of Foreign and European Affairs, and the UK Foreign and Commonwealth Office. Available at: <u>https://www.oecd.org/swac/publications/47234320.pdf</u> [Accessed on 11 March 2017]
- Higley, J., Field, G.L. and Groholt, K. (1976). *Elite Structure and Ideology. A Theory with Application to Norway.* New York: Universitetsforlaget/Oslo, Columbia University Press.
- Hesseling, G.S.C.M. (1996). "Legal and institutional conditions for local management of natural resources: Mali." In Bakema, R.J. (eds). Royal Tropical Institute (KIT): Amsterdam, The Netherlands. (pp. 30-46) Available at: <u>https://openaccess.leidenuniv.nl/bitstream/handle/1887/9365/ASC_1247243_029.pdf?seq uence=1</u> [Accessed on 14 May 2017]
- Holthuijzen, W.A. (2011). "Dry, Hot, and Brutal: Climate Change and Desertification in the Sahel of Mali." *Journal of Sustainable Development in Africa*, *13*(7):245-268.
- Homer-Dixon, T.F. (1994). "Environmental Scarcities and Violent Conflict: Evidence from Cases." *International Security*, 19(1):5-40.
- Horrowitz, D.L. (1985). Ethnic Groups in Conflict. Berkeley: University of California Press.
- Hsiang, S. M., Burke, M., & Miguel, E. (2013). "Quantifying the influence of climate on human conflict." *Science*, *341*(6151), 1235367:1-14
- Huntjes, P. and Nachbar, K. (2015). "Climate Change as a Threat Multiplier for Human Disaster and Conflict." *The Hague Institute for Global Justice: Working Paper 9*:1-24.
- Hussein, K., Sumberg, J. and Seddon, D. (1999). "Increasing Violent Conflict between Herders and Farmers in Africa: Claims and Evidence." *Development Policy Review*, 17:397-418.
- Hussein, K. (1998). "Conflict between farmers and Herders in the semi-arid Sahel and East Africa: A Review." London: IIED/OD Group. Available at: http://pubs.iied.org/pdfs/7386IIED.pdf [Accessed on 12 April 2017]
- IIED. (2004). Making Land Rights More Secure. International workshop for researchers and policy makers, Ouagadougou (March 19-21, 2002). Available at: <u>http://pubs.iied.org/pdfs/9446IIED.pdf</u> [Accessed on 18 May 2017]
- International Crisis Group (2016). "Central Mali: An Uprising in the Making?" *Africa Report No.238.* Available at: <u>https://www.crisisgroup.org/africa/west-africa/mali/central-mali-uprising-making</u> [Accessed on 18 April 2017]

- IPCC (2014). Summary for Policymakers. In: "Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change." M. L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds.). Cambridge University Press: Cambridge, UK. pp:7-22.
- IPCC (2014). Summary for policymakers. In: "Climate change 2014: Impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovermental Panel on Climate Change." C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, Y.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, L.L. White (eds). Cambridge University Press: Cambridge, UK and New York, USA. pp:1–32
- IRIN (Integrated Regional Information Networks) & OCHA (Office for the Coordination of Humanitarian Affairs) (2008). "Sahel: region is 'ground zero' for climate change – Egeland." Available at: <u>http://www.irinnews.org/news/2008/06/02</u> [Accessed on 18 February 2017]
- IRIN News (Integrated Regional Information Networks) (June 2008). "Backgrounder on the Sahel, West Africa's poorest region." Feature: Environment and Disaster. Available at: <u>http://www.irinnews.org/feature/2008/06/02</u> [Accessed on 11 March 2017]
- Johnson, M., Mayrand, K. and Paquin, M. (2006). *Governing Global Desertification: Linking Environmental Degradation, Poverty and Participation.* Ashgate Publishing: Hampshire, the UK.
- Jones-Casey, K. and Knox, A. (2011). "Farmer-Herder Conflicts in Mali." *Focus on Land in Africa* (February). Available at: <u>https://agriknowledge.org/downloads/z603qx506</u> [Accessed on 18 April 2017]
- Kabore, P. D. (2008). "Conflicts over land in the Niger delta region of Mali: exploring the usefulness of SAM and CGE models to study participatory natural resource management in agricultural and pastoral systems." Doctoral Thesis. Groningen: University of Groningen. Available at: <u>http://www.rug.nl/research/portal/publications/conflicts-over-land-in-the-niger-river-delta-region-of-mali(e52b5e73-742a-4d67-883e-c172f93ce69d).html [Accessed on 18 April 2017]
 </u>
- Kagone, H. (2017). Country Pasture/Forage Resource Profiles: Burkina Faso. Food and Agriculture Organization of the United Nations (FAO). Available at: <u>http://www.fao.org/ag/agp/agpc/doc/counprof/burkinafeng.htm</u> [Accessed on 28 April 2017]

- Kahl, C.H. (2006). *States, scarcity and civil strife in the developing world*. Princeton & Oxford: Princeton University Press.
- Kaplan, R.D. (1994). "The Coming Anarchy: ow scarcity, crime, overpopulation, tribalism and disease are rapidly destroying the social fabric of our planet." *The Atlantic Monthly*, 273:44-65.
- Kelman, H.C. (2005). "National Identity and the Role of the 'Other' in Existential Conflicts: The Israeli-Palestinian Case." Keynote address presented at the conference on Transformation of Intercultural Conflicts at the University of Amsterdam. Available at: <u>http://www.nosmo.nl/isj/kelman.pdf</u> [Accessed on 18 May 2017]
- Kelman, H.C. (2001). "The Role of National Identity in Conflict Resolution: Experiences from Israeli-Palestinian Problem-Solving Workshops." In Ashmore, R.D., L. Jussim and D. Wilder (eds.) Social Identity, Intergroup Conflict, and Conflict Reduction. Oxford and New York: Oxford University Press. (pp.187-212).
- Keys, D. "Mali: The history behind the world's newest conflict." *Aspen Institute*. Available at: <u>https://www.aspeninstitute.it/aspenia-online/system/files/inline/keys-ing_080413.pdf</u> [Accessed on 14 May 2017]
- Kirwin, M.F. (2010). "Violent Communal Conflict in Burkina Faso: A Multi-Level Examination." PhD Dissertation: Michigan State University.
- Klomp, J. and Bulte. E. (2013). "Climate change, weather shocks, and violent conflict: A critical look at the evidence." *Agricultural Economics*, 44:63-78.
- Krause, J. (2016). "Non-violence and Civilian Agency in Communal War: Evidence from Jos, Nigeria." *Africa Affairs*, *116*(463):261-283.
- Lecocq, B. (2010). Disputed Desert: Decolonization, Competing Nationalisms, and Tuareg Rebellions in Northern Mali. Leiden, The Netherlands: Koninklijke Brill NV.
- Lieberman, E. (2005). "Nested Analysis as a Mixed-Method Strategy for Comparative Research." *American Political Science Review*, *99*(3):435-452.
- Marty, A. (1993). "La gestion des terroirs et les eleveurs: un outil d'exclusion ou de negociation?" *Revue Tiers Monde*, *34*(134):327-344
- May, J.F., Guengant, J.P. and Brooke, T.R. (2015). "Demographic Challenged of the Sahel." *Population Revenue Bureau*. Available at: <u>http://www.prb.org/Publications/Articles/2015/sahel-demographics.aspx</u> [Accessed on 15 April 2016]

- Mbaiwa, J.E. and Darkoh, M.B.K. (2005). "Sustainable Development and Natural Resource Competition and Conflicts in the Okavango Delta, Botswana." *Botswana Notes and Records*, 17:40-60.
- McCay, B. (2002). Emergence of Institutions for the Commons: Contexts, Situations and Events. In Ostrom, E. et al (eds.) *The Drama of the Commons*. Washington DC: National Academy Press.
- McCarthy, J. et al. (2001). *Climate change 2001: Impacts, adaptation and vulnerability*. Cambridge: Cambridge University Press.
- McDonald, M. (2013). "Discourses of climate security." Political Geography, 33:42-51.
- Meierding, E. (2013). "Climate change and conflict: Avoiding small talk about weather." *International Studies Review*, 15(2):185-203.
- Ministry for Environment and Sanitation (2008). "Elements of National Policy for Adaptation to Climate Change: Final Report." Republic of Mali. Available at: <u>http://www.adaptationundp.org/sites/default/files/downloads/mali_-_national_policy_2008.pdf</u> [Accessed on 1 May 2017]
- Mjos, O.D. (2007). Nobel Peace Prize Award Ceremony Speech. Oslo (10 December). Available at: <u>http://www.nobelprize.org/nobel_prizes/peace/laureates/2007/presentation-</u> <u>speech.html</u> [Accessed on 19 February 2017]
- Monod, T. (1975). *Pastoralism in tropical Africa*. London: International African Institute/Oxford University Press.
- Moore, K.M., et al. (1999). "Conflict and Natural Resource Management in Agricultural and Pastoral Systems: of Arid and Semi-Arid Regions of West Africa." (pp.1-22) Available at: <u>https://vtechworks.lib.vt.edu/bitstream/handle/10919/65707/108_9901Ep.pdf?sequence=</u> 1 [Accessed on 2 May 2017]
- Moorehead, R. (1992) "Chapter 7: Land Tenure and Environmental Conflict: The Case of the Inland Niger Delta, Mali." In Kakonen, J. (eds.) *Perspectives on Environmental Conflict and International Relations*. London, New York: Pinter Publishers. (pp. 96-115).
- Moritz, M. (2006). "Changing Contexts and Dynamics of Farmer-Herder Conflicts Across West Africa." *Canadian Journal of African Studies*, 40(1):1-40.
- Mortimore, M.J. and Adams, W.M. (2001). "Farmer adaptation, change and 'crisis' in the Sahel." *Global Environmental Change*, 11:49-57.

- Mortimore, M.J. (1998). *Roots in the African dust: sustaining the sub-Saharan drylands*. Cambridge University Press.
- National Aeronautics and Space Administration (NASA) (2004). *Earth Observatory*. Available at: <u>https://earthobservatory.nasa.gov/IOTD/view.php?id=7277</u> [Accessed on 14 April 2017]
- Ngaido, T. (1994). "Natural resource management (NRM) or decision making management (DMM): The tenure question in the Africare Goure project. Paper prepared for Africare-Niger.
- Nura, S. (1996). "Agricultural development in the age of sustainability: Livestock production." In Benneh, G., et al. (eds.) Sustaining the Future: Economic, Social, and Environmental Change in Sub-Saharan Africa. Tokyo: United Nations University Press.
- Nyong, A., Adesina, F., Osman Elasha, B. (2007). "The value of indigenous knowledge in climate change mitigation and adaptation strategies in the African Sahel." *Mitigation Adaptation Strategies Global Change*, 12:787-797.
- Oskarson, M. (2010). "Social and Political Marginalization in Hard Times." Paper prepared for the 2010 American Political Science Association (APSA) annual meeting in Washington D.C., USA, and Swedish Political Science Meeting in Gothenburg. (pp.1-30). Available at: <u>http://pol.gu.se/digitalAssets/1315/1315612_swepsa-social-and-political-</u> <u>marginalization-in-hard-times--maria-oskarson.pdf</u> [Accessed on 16 May 2017]
- Pettersson T. and Themner, L. (2011). *States in armed conflict 2010*. Department of Peace and Conflict Research, Uppsala University.
- Percival, V. and Homer-Dixon, T. (1998). "Environmental Scarcity and Violent Conflict: The Case of South Africa." *Journal of Peace Research*, *35*(3):279-298.
- Posner, D. (2005). *Institutions and Ethnic Politics in Africa*. New York: Cambridge University Press.
- Rademaker, M. (2016). "The Economics of Planetary Security: Climate Change as an Economic Conflict Factor." *Planetary Security Initiative*.
- Raleigh, C. (2010). Political Marginalization, Climate Change and Conflict in Africa Sahel." *International Studies Review*, *12*(1):69-86.
- Raleigh, C. and Urdal, H. (2007). "Climate Change, environmental degradation and armed conflict." *Political Geography*, 26:674-694.

- Rance, A. and Funfgeld, H. (2014). "Rural People: Resilient Futures Social vulnerability to climate change in rural contexts." Centre for Urban Research RMIT University, Melbourne.
- Reuters (2012). "Thirty die in Mali-Burkina Faso ethnic border clash." World News. Available at: <u>http://www.reuters.com/article/us-burkinafaso-mali-clashes-</u> <u>idUSBRE84002920120525</u> [Accessed on 17 April 2017]
- RFI (2016). Mali: le bilan des tensions communautaires s'aloudit dans la region de Mopti. Available at: <u>http://www.rfi.fr/afrique/20160504-mali-bilan-tensions-peul-bambara-region-mopti</u> [Accessed on 17 April 2017]
- Ruttinger, L., Smith, D., Stang, G., Tanzler, D., and Vivekananda, J. (2015). "A New Climate for Peace: Taking Action on Climate and Fragility Risks." An Independent Report Commissioned by the G7 Members. pp. 1-150.
- Scarritt, J. (1994). "Nonviolent Versus Violent Ethnic Political Action in Africa." In Justice Without Violence. Paul Wehr, Heidi Burgess, and Guy Burgess (eds.) Boulder, CO: Lynne Rienner.
- Scheffran, J. et al. (2012). "Climate Change and Violent Conflict." Science, 336(6083):869-871.
- Smith, C.R. (2014). "National Identity, Military Rule and French Intervention in Mali's Recent Political Crisis." MA Thesis. University of California.
- Stewart, F. (2009). "Horizontal inequalities as a cause of conflict: A review of CRISE Findings." World Bank: World Development Report 2011, Background Paper. Available at: <u>http://siteresources.worldbank.org/EXTWDR2011/Resources/6406082-</u> <u>1283882418764/WDR_Background_Paper_Stewart.pdf</u> [Accessed on 20 March 2017]
- Stewart, F., and Brown, G.K. (2007). "Motivations for Conflict: Groups and Individuals." In Crocker, Chester A., Fen Osler Hampson, and Pamela Hall (eds.) *Leashing the Dogs of War: Conflict Management in a Divided World*. Washington D.C.: United States Institute of Peace Press.
- Stewart, F. (2002). "Horizontal Inequalities: A neglected Dimension of Development (Working Paper No.81). Available at: <u>http://www3.qeh.ox.ac.uk/pdf/qehwp/qehwps81.pdf</u> [Accessed on 20 March 2017]
- Stipp, D. (2004). "The Pentagon's weather nightmare: the climate could change radically, and fast. That would be the mother of all national security issues." *Fortune Magazine: Archives* (February 2004). Available at: <u>http://archive.fortune.com/magazines/fortune/fortune_archive/2004/02/09/360120/index. <u>htm</u></u>

- Straus, S. (2011). "Mali and its Sahelian Neighbors." World Development Report: Background Case Study. Available at: <u>http://web.worldbank.org/archive/website01306/web/pdf/wdr_2011_case_study_mali.pdf</u> [Accessed on 12 March 2017]
- Sundberg, R., Eck, K. and Kreutz, J. (2012). "Introducing the UCDP Non-State Conflict Dataset." *Journal of Peace Research*, 49(2):351-362.
- Thebaud, B., and Batterbury, S. (2001). "Sahel Pastoralists: Opportunism, Struggle, Conflict and Negotiation: A case study from eastern Niger." *Global Environmental Change*, 11:69-78.
- The Hague Center for Strategic Studies (HCSS). Climate Change Vulnerability Monitor. Available at: <u>http://projects.hcss.nl/monitor/</u> [Accessed on 9 May 2017]
- Theisen, O.M., Gleditsch, N.P and Buhaug, H. (2013). "Is climate-change a driver of armed conflict?" *Climatic Change*, *117*:613-625.
- Theisen, O.M. (2012). "Climate clashes? Weather variability, land pressure, and organized violence in Kenya, 1989-2004." *Journal of Peace Research*, 49(1):81-96.
- Theisen, O.M., Hotermann, H. and Buhaug, H. (2011). "Climate Wars? Assessing the Claim that Drought Breeds Conflict." *International Security*, *36*(3):79-106.
- Theisen, O.M. (2008). "Blood and Soil? Resource Scarcity and Internal Armed Conflict Revisited." *Journal of Peace Research*, 45(6):801-818.
- The Wire (2017). "At least 13 killed in ethnic clashes in central Mali." *World News*. Available at: <u>https://thewire.in/108565/13-kiled-ethnic-clashes-central-mal/</u> [Accessed on 23 April 2017]
- The World Bank Data (2015). Socio-Economic Indicators. Available at: <u>http://data.worldbank.org/</u> [Accessed on 15 April 2017]
- The World Bank Group (2011). "Climate Risk and Adaptation Country Profile: Vulnerability, Risk Reduction, and Adaptation to Climate Change, Mali."
- The World Bank. 2011. Vulnerability, Risk Reduction, and Adaptation to Climate Change: Burkina Faso. Climate Risk and Adaptation Country Profile Series. World Bank, Global Facility for Disaster Reduction and Recovery, Climate Investment Funds, and Climate Change Team ENV, Washington, DC. Available at: http://sdwebx.worldbank.org/climateportalb/doc/GFDRRCountryProfiles/wb_gfdrr_clim ate_cha nge_country_profile_for_BFA.pdf
- The World Bank Group (n.d.). Country Note on Disaster Risk Management and Adaptation to Climate Change in Burkina Faso. Available at:

https://www.gfdrr.org/sites/gfdrr.org/files/documents/Country_Program_Burkina_Faso.p df [Accessed on 3 May 2017]

- Tonah, S. (2002). "Fulani Pastoralists, Indigenous Farmers and the Contest for Land in Northern Ghana." *Africa Spectrum*, *37*(1):43-59.
- Traore, S. (2013). "Dirty droughts causing loss and damage in Northern Burkina Faso." *International Journal of Global Warming*, 5(4):498-513.
- Tremolieres, M. (2013). "Conflict over Resources and Terrorism: Two Facets of Insecurity." West African Studies: Sahel and West Africa Club Secretariat (SWAC)/OECD. Available at: <u>http://www.oecd.org/swac/publications/conflict-over-resources.htm</u> [Accessed on 12 March 2017]
- Turner, M. (2004). "Political ecology and the moral dimensions of 'resource' conflicts': The case of farmer-herder conflicts in the Sahel." *Political Geography*, *23*(7):863-889.
- United Nations Development Program (UNDP) (2017). Human Development Index (HDI): Burkina Faso. Available at: <u>http://hdr.undp.org/en/countries</u> [Accessed on 28 April 2017]
- United Nations Environment Programme (2007). *Sudan: post-conflict environmental assessment.* (Nairobi: UNEP).
- UNFCCC, 2001. Burkina Faso UNFCCC National Strategy. United Nations Framework Convention on Climate Change. Available at: http://unfccc.int/resource/docs/natc/bufstrat.pdf.
- USAID (2015). "Synthese des Programmes Quinquennaux de Securite Alimentaire de la Region de Gao." Available at: <u>http://fsg.afre.msu.edu/mali_fd_strtgy/plans/gao/P_S_A_REG_GAO_vfb.pdf</u> [Accessed on 23 April 2017]
- USAID (2014). "Mali Climate Vulnerability Mapping." African and Latin American Resilience to Climate Change Project (ARCC). Available at: <u>http://www.ciesin.org/documents/Mali-CV-Mapping.pdf</u> [Accessed on 23 April 2017]
- USAID (2012). Climate Vulnerabilities and Development in Burkina Faso and Niger: Background Paper. USAID Technical Report (November). Available at: <u>http://www.adaptationlearning.net/sites/default/files/resource-files/Climate-</u> <u>Vulnerabilities-and-Development-in-Burkina-Faso-and-Niger-report.pdf</u> [Accessed on 28 April 2017]
- Van den Brink, R., Bromley, D.W. and Chavas, J. P. (1995). "The Economics of Cain and Abel: Agro-pastoral property rights in the Sahel." *The Journal of Development Studies*, *31*(3):373.

- Van Veen, E., Goff, D. and Van Damme, T. (2015). "Beyond dichotomy: Recognizing and reconciling legal pluralism in Mali." Conflict Research Unit (CRU), Clingendael Institute. Available at: <u>https://www.clingendael.nl/pub/2015/beyond_dichotomy/</u> [Accessed on 18 April 2017]
- Varshney, A. (2002). *Ethnic Conflict and Civic Life: Hindus and Muslims in India*. New Haven, Yale University Press.
- Varshney, A. (2001). Ethic Conflict and Civil Society: India and Beyond." World Politics, 53:362-98. Available at: <u>http://www.la.utexas.edu/users/chenry/core/Course%20Materials/Varshney/53.3varshney</u>.<u>pdf</u> [Accessed on 3 May 2017]
- Von Uexkull, N. (2014). "Climate variability, vulnerability and armed conflict in sub-Saharan Africa." In Urmilla, Bob and Salome Bronkhorst (eds.) *Conflict-sensitive adaptation to climate change in Africa*. Berliner Wissenschafts-Verlag (BWV): Berlin, Germany. pp. 161-176.
- Watts, R. (2012). "Case Study: Managing Climate Change and Conflict in Mali." Climate Change in Difficult Environments Learning Cycle of the Learning Hub (pp.1-4). Available at: <u>https://www.ids.ac.uk/files/dmfile/LHcasestudy13-Mali.pdf</u> [Accessed on 25 April 2017]
- Wisner, B. (2004). "Assessment of capability and Vulnerability." In G. Bankoff, G. Frerks, and D. Hilhorst (eds.) *Mapping vulnerability: Disasters, development and people*. London, UK: Earthscan. pp. 183-193.
- Witsenburg, K. and Adano, W.R. (2007). "The use and management of water resources in Kenya's drylands: Is there a link between scarcity and violent conflicts?" In Bill Derman, Rie Odgaars and Espen Sjaastad (eds.) Conflicts over Land and Water in Africa. Oxford: James Currey, 215-238.
- Yanda, P. and Bronkhorst, S. (2011). "Climate change and conflict: Conflict-sensitive climate change adaptation in Africa." *Policy & Practice Brief: Knowledge for durable peace by the African Centre for the Constructive Resolution of Disputes (ACCORD)*, Issue 014:1-6.
- Zongo, M. (2009). "Terre d'Etat, loi des ancetres? Les conflits fonciers et leurs procedures de reglement dans l'outest du Burkina Faso." In *Les Cahiers du Cerlesh, 33*. Available at : <u>www.hubrural.org/IMG/pdf/Terre_d_Etat_loi_ancetres_Zongo.pdf</u> [Accessed on 28 April 2017]

ANNEX

Annex 1. Indicators Utilized by Component of Vulnerability,	, USAID ((2014)
---	-----------	--------

Component	Indicator Code	Data Layer
Exposure	PRCP	Average annual precipitation (1950-2009)
	IACV	Inter-annual coefficient of variation in precipitation (1950-2009)
	DCVAR	% of precipitation variance explained by decadal component (1950-2009)
	NDVICV	Coefficient of variation of the Normalized Difference Vegetation Index (NDVI) (1981-2007)
	TTREND	Long-term trend in temperature in July-August- September (1950-2009)
	FLOOD	Flood Frequency (1999-2007)
Sensitivity	HHWL	Household wealth (2006)
	STNT	Child stunting (2006)
	IMR	Infant mortality rate (IMR) (2006)
	POVI	Poverty Index by commune (2008)
	CONF	Conflict events/political violence (1997-2012)
	CARB	Soil organic carbon/soil quality (1950-2005)
	MALA	Malaria stability index
Adaptive Capacity	EDMO	Education level of mother (2006)
	MARK	Market accessibility (travel time to major cities)
	HEALTH	Health infrastructure index (2012)
	ANTH	Anthropogenic biomes (2000)
	IRRI	Irrigated areas (area equipped for irrigation) (1990-2000)

Source: USAID (2014).



Annex 2. Vulnerability Index for Each Component (Mali)

Source: USAID (2014).

Annex 3. Vulnerability to Weather Related Disasters (Mali and Burkina Faso)

Droughts, floods, extreme temperatures (% of population affected, average) (2009)





Source: Climate Change Vulnerability Monitor, The Hague Center for Strategic Studies (HCSS) (2017).

Annex 4. Vulnerability to Loss of Agricultural Productivity (Mali and Burkina Faso) Impact on agriculture (% of GDP) (2080)





Source: Climate Change Vulnerability Monitor, The Hague Center for Strategic Studies (HCSS) (2017).

Annex 5. Country Scores for Each HDR Indicator

	HDI Value	HDI Rank	Life Expectancy at Birth	Expected Years of Schooling	Mean Years of Schooling	GNI per capita (PPP US\$)
Mali	0.442	175	58.5	8.4	2.3	2,218
Burkina Faso	0.402	185	59.0	7.7	1.4	1,537

Annex 5.1. Human Development Index (HDI) and Sub-Values: Mali and Burkina Faso

Annex 5.2. Inequality-adjusted Human Development Index (IHDI) and Sub-Values: Mali and Burkina Faso

	IHDI Value	Overall Loss (%)	Human Inequality Coefficient (%)	Inequality in Life Expectancy at Birth (%)	Inequality in Education (%)	Inequality in Income (%)
Mali	0.293	33.7	32.7	40.4	41.6	16.1
Burking Faco	0.267	33.6	33.3	37.1	38.6	24.2

Annex 5.3. Gender Development Index (GDI) and Sub-Values: Mali and Burkina Faso

	Life Expectancy at Birth		Expected Years of Schooling		Mean Years of Schooling		GNI per capita		HDI Values		F-M Ratio
	Female	Male	F	M	F	M	F	M	F	M	GDI
											Value
Mali	58.3	58.6	7.5	9.4	1.7	3.0	1,349	3,071	0.385	0.491	0.786
Burkina Faso	60.3	57.6	7.3	8.1	1.0	2.0	1,278	1,800	0.375	0.429	0.874

Annex 5.4. Gender Inequality Index (GII) and Sub-Values: Mali and Burkina Faso

	GII Value	GII Rank	Maternal Mortality Ratio	Adolescent Birth Rate	Female Seats in Parliament (%)	Pop. v least Secor Edu.	Pop. with at least Some Secondary Edu. (%)		Labor Force Participation Rate (%)	
						F	M	F	M	
Mali	0.689	156	587	174.6	8.8	7.3	16.2	50.1	82.3	
Burkina Faso	0.615	146	371	108.5	9.4	6.0	11.5	76.6	90.7	

Annex 5.5. Multidimensional Poverty Index (MPI) and Sub-Values: Mali and Burkina Faso

	Survey Year	MPI Value	Head- Count (%)	Intensity of Deprivation (%)	Popul	Population Share (%) Poverty of Deprivation (%)				to Overall privations
					Near	In	Below	Health	Edu.	Living
					Poverty	Severe	Income			Standards
						Poverty	Poverty			
							Line			
Mali	2012-	0.456	78.4	58.2	10.8	55.9	49.3	22.4	37.9	39.7
	2013									
Burkina	2010	0.508	82.8	61.3	7.6	63.8	43.7	22.5	39.0	38.5
Faso										

Source: UNDP (2016)