

Climate Change and the Risk of Violent Conflicts in Southern Africa

Ashok Swain
Ranjula Bali Swain
Anders Themnér
Florian Krampe



Promoting rights through
policy and practice.

Climate Change and the Risk of Violent Conflicts in Southern Africa

by

**Ashok Swain
Ranjula Bali Swain
Anders Themnér
Florian Krampe**

June 2011



Promoting rights through
policy and practice.

Title: Climate Change and the Risk of Violent Conflicts
in Southern Africa

Authors:

Ashok Swain

Ranjula Bali Swain

Anders Themnér

Florian Krampe

June 2011

This study is produced by the Center for Sustainable Development, Uppsala University for the Swedish International Development Cooperation Agency (Sida) Funded Collaborative Project 'Climate Change, Natural Resource Governance and Conflict Prevention in Africa'.

Project Partners:

Global Crisis Solutions, Pretoria

Center for Sustainable Development, Uppsala University, Uppsala

The Swedish Defence Research Agency, Stockholm

Cover Photograph:

Satellite image showing the Zambezi river's annual flood near the small city of Kasane in the Zambezi's upper reaches.

Source: NASA. Earth Observatory image created by Jesse Allen and Robert Simmon, using EO-1 ALI data provided courtesy of the NASA EO-1 team. (<http://earthobservatory.nasa.gov/IOTD/view.php?id=44132>)

Publisher:

Global Crisis Solutions

Postnetsuit 417, Private bag X15

Menlo Park 0102 Pretoria

South Africa.

ISBN: 978-0-620-50465-2

Contents

Foreword	9
Summary	11
1 Introduction	13
1.1 Climate Change – The Scientific Foundations	14
1.2 Climate Change/Variability – The Security Issues	18
1.3 Climate Change/Variability – The Conflict Connection	21
2 Socio-Economic and Political Dimensions	24
2.1 The Impact of Climate Change/Variability on the Socio-Economic System	24
2.2 Political System and Climate Change/Variability	26
2.2.1 Elites	27
2.2.2 Institutions	29
2.2.3 Social Identities	32
2.3 Interaction of Climatic, Socio-Economic and Political Factors	34
3 The Zambezi River Basin	36
3.1 The Zambezi Basin and its Geography and Climate	37
3.2 Climate Change/Variability in the Zambezi Basin	41
3.2.1 Water and Precipitation	41
3.2.2 Increasing Temperatures	43
3.2.3 Sea Level Rise and Coastal Erosion	44
3.2.4 Extreme Weather Events	44
3.3 Economic Impact of Climate Change/Variability in the Zambezi Basin	47
3.3.1 Impact on Agricultural Productivity, Food Security and Droughts	47
3.3.1.1 Precipitation Variability	48
3.3.1.2 Sea Level Rise	49
3.3.1.3 Health Hazards	49
3.4 Southern Africa and its Weak Political Structure	50
3.4.1 Bad Leaders – Elites in Southern Africa	51
3.4.2 Weak Institutions	52
3.4.3 Polarized Social Identities - Longtime Struggles and Protracted Identities	53
4 Zimbabwe and Mozambique: Focus Areas	55
4.1 Vulnerability of Zimbabwe and Mozambique to Climate Change/Variability	55
4.2 Zimbabwe	58
4.2.1 Climate Change/Variability in Zimbabwe	58
4.2.2 Economic Impact of Climate Change/Variability in Zimbabwe	60
4.2.3 Political Situation in Zimbabwe	65
4.2.3.1 Bad Leaders in Zimbabwe and Bulawayo Matabeleland North	65
ZANU-PF Elites	65

Opposition Elites	69
4.2.3.2 Weak Institutions in Bulawayo/Matabeleland-North	72
Inability to Ensure the Socio-Economic Wellbeing of Citizens	73
Faulty Democratic Institutions and Lack of Rule of Law	75
4.2.3.3 Polarized Social Identities	78
Radicalization of the Ndebele Community	78
Overlapping Politicized Identities and the Risk of Climate Change/Variability Induced Violence	80
4.3 Mozambique	82
4.3.1 Climate Change/Variability in Mozambique	82
4.3.2 Economic Impact of Climate Change/Variability in Mozambique	84
4.3.3 Political Situation in Mozambique	88
4.3.3.1 Bad Leaders in Mozambique and Zambezia	88
FRELIMO-Elites	88
RENAMO Affiliated Elites	91
4.3.3.2 Weak Institutions in Mozambique and Zambezia	94
Inability to Ensure the Socio-Economic Wellbeing of Citizens	95
Faulty Democratic Institutions and Lack of Rule of Law	97
4.3.3.3 Polarized Social Identities in Mozambique and Zambezia	99
Segmentation of Wartime Identities	100
Overlapping Politicized Identities and the Risk of Climate Change/Variability Induced Violence	102
5 Conclusion	104
References	107

Figures

Figure 1: Socio-Economic Impact of Climate Change/Variability	26
Figure 2: Quality of Governance and the socio-economic Impact of Climate Change/Variability	27
Figure 3: Climate Change/Variability, the Socio-Economic System and Political Governance	35
Figure 4: The Zambezi River Basin (Source: http://mapsof.net/zambia/static-maps/jpg/zambezi-river-basin-fr/full-size)	37
Figure 5: People Affected by Natural Disasters in Africa from 1971 to 2001 (http://www.fao.org/ag/agl/agll/drylands/mapsafrica.htm)	46
Figure 6: Crop Production Index (1999-2001=100) for Mozambique, Zimbabwe and Sub-Saharan Africa. Source: Food and Agriculture Organization, electronic files and web site.	58

Tables

Table 1: The Zambezi basin: areas and rainfall by country (Source: FAO)	38
Table 2: Agricultural Drylands (Source: FAO/AGL 2003)	39
Table 3: Agricultural land in the Zambezi Basin Countries (Source: UNSTATS)	40
Table 4: Forest Area in the Zambezi Basin Countries (Source: UNSTATS)	41
Table 5: Hydrological Disasters database (Source: UN Statistics)	45
Table 6: Climatic challenges, vulnerable sectors and vulnerability context in South Africa	56
Table 7: Basic Indicators for southern African countries	57
Table 8: Basic Indicators for southern African countries	59
Table 9: Zimbabwe's Provincial level data for access to land for cultivation, size of landholding, adequacy of land distribution and food poverty	61
Table 10: Percent Change in Area of Maize Production in Zimbabwe's Provinces	63
Table 10 (continued)	63
Table 11: Farm Class Percent Change in Area from 2000-2009 in Zimbabwe (Satellite Estimates)	64
Table 12: Mozambique: Area planted to the major food crops, 2002/03 (hectares)	85
Table 13: Mozambique: Production of major food crops 2002/03, by province ('000 tons)	86
Table 14: Mozambique: Crop production in 2002/03 and 2001/02, by region ('000 tons)	87

Foreword

Through support and funding from the Swedish International Development Cooperation Agency (Sida) – the “Partnership Development Cooperation mechanism”, a unique partnership of three institutions: Global Crisis Solutions, Uppsala University and FOI (Swedish Defence Research Agency) has embarked on a regional project that integrates climate change/variability, natural resource governance and conflict prevention in Africa. Southern Africa is the first phase of an envisioned three-phase project that will ultimately cover East and West Africa.

This publication is the first product of this collaboration and effectively examines the challenges faced in Southern Africa and specifically the Zambezi river basin as a direct result of climate change/variability. Other recent research has shown that climate change has the potential to alter the prevalence and severity of extreme events such as heat waves, cold waves, storms, floods and droughts.

The research team at Uppsala University has explored the potential for climate change/variability to act as a threat multiplier to societies along the Zambezi river basin, and have critically drawn a correlation between socio-political problems, the governance of resources and the weakened adaptive capacities of these communities. The authors also carefully situate the complexity of the climate change/variability impacts by acknowledging other external factors that include economic challenges at play in this region.

This analysis presents a better understanding of the vulnerabilities to climate change/variability in Southern Africa and the potential for conflict in the region. Other exacerbating factors such as poor political governance, weak institutions, polarized social identities and the negative effect that these may have on weakening capacities in society have been included in the analysis.

For a continent that aspires to attain regional integration, this publication will further reinforce the need for appropriate regional early warning and conflict prevention mechanisms, and a policy environment that recognises these climate change/variability induced challenges.

By examining the climate change/variability, resource governance, socio-political context and the economic challenge nexus, the authors have ensured that this publication remains relevant for policy makers in Southern Africa, Africa, and also serve as a critical analytical tool for conflict prevention, disaster risk reduction, and climate change adaptation program practitioners.

David Mwaniki
Chief Executive
Global Crisis Solutions

Summary

This study aims to identify regions in the Zambezi River Basin in Southern Africa that are prone to risk of violent conflicts (collective violence, popular unrest) induced by climatic changes/variability. The Zambezi River is 2575 kilometres long and the basin covers eight countries: Zambia, Angola, Zimbabwe, Malawi, Tanzania, Botswana, Mozambique and Namibia.

Besides the ecological impact, the study argues that socio-economic and political problems are disproportionately multiplied by climate change/variability. Climate change/variability amplifies stresses on the socio-political fabric because it affects the governance of resources, and hence, is linked to the weakened mitigation and adaptation capacity of societies, that are already facing economic challenges (rising food prices, etc.). Society becomes highly vulnerable to climate induced conflicts when it suffers from poor central leadership, weak institutions and polarized social identities. Taking all these factors into consideration, this study identifies Bulawayo/Matabeleland-North in Zimbabwe and the Zambezia Province in Mozambique as the most likely regions to experience climate induced conflicts in the near future. The reasons for arriving at this conclusion are:

- a) Climate change/variability will have a significant impact on these two regions; due to increasing water scarcity in Bulawayo/Matabeleland-North; and intensified flooding, sea-level rise, and costal erosion in the Zambezia Province.
- b) Due to climate change/variability, agricultural production in these two regions will become highly volatile, leading to severe food insecurity.
- c) Both regions are suffering from low quality political governance, having unscrupulous elites, weak institutions, and polarized social identities.

The aim of this study is to identify areas in the Zambezi River Basin that are prone to the risk of violent conflict (collective violence, popular unrest) induced by climatic changes/variability. The 3,500 kilometer long Zambezi River plays an indispensable role for southern African socio-economic life. 128 million people inhabit the eight states that neighbor the Zambezi River Basin and depend on the river directly or indirectly as a source for food and water. At the same time, climate change/variability is expected to hit sub-Saharan Africa stronger than many other parts of the world.

Several studies attest that environmental stress and changes are catalysts that create societal insecurity that may evolve into conflict (Swain 1993; Wallenstein and Swain 1997; Gleditsch 1998; Nordas and Gleditsch 2007; Machlis and Hanson 2008; Salehyan 2008; Lee 2009). Moreover, some scholars emphasize that the effects of climate change/variability influence the occurrence of armed conflict (German Advisory Council on Global Change 2007; Barnett and Adger 2007; Buhaug et al. 2008; Collier et al. 2008a; Raleigh et al. 2008; Lee 2009). They assert that 'increasing scarcity and variability of renewable resources, sea-level rise, and intensification of natural disasters' are relevant in relation to armed conflict (Buhaug et al. 2008).

In this study, an attempt is been made to correlate climatic forecasts with socio-economic and political developments in the Southern African region. Based on this approach, attempts are made to determine which regions in the Zambezi Basin are more likely to experience conflicts (collective violence, popular unrest) because of the impact of climate change/variability. Vulnerability to climate change/variability of the regions has been measured taking into account the impact of existing socio-economic and political factors. Besides the ecological impact, the study argues that socio-economic and political problems are disproportionately multiplied by climate change/variability. Additionally,

climate change/variability correlates considerably with problematic political structures and dynamics, because these affect the governance of resources, and hence, are linked to a weakened mitigation and adaptation capacity of societies to the impacts of climate change, as well as facing economic hurdles (rising food prices, etc.).

I.1 Climate Change – The Scientific Foundations

Climate change is defined as the significant variation of the mean state of climate relevant variables such as temperature, precipitation and wind in a certain period of time, commonly over 30 years (IPCC 2007). These changes can be natural, resulting from the climatic system and its internal dynamics. But, climate changes can also be induced through external influences:

The climate system evolves in time under the influence of its own internal dynamics and due to changes in external factors that affect climate (called ‘forcings’). External forcings include natural phenomena such as volcanic eruptions and solar variations, as well as human-induced changes in atmospheric composition. Solar radiation powers the climate system. There are three fundamental ways to change the radiation balance of the Earth: 1) by changing the incoming solar radiation (e.g., by changes in Earth’s orbit or in the Sun itself); 2) by changing the fraction of solar radiation that is reflected (called ‘albedo’; e.g., by changes in cloud cover, atmospheric particles or vegetation); and 3) by altering the longwave radiation from Earth back towards space (e.g., by changing greenhouse gas concentrations). Climate, in turn, responds directly to such changes, as well as indirectly, through a variety of feedback mechanisms (IPCC 2007).

The distinction made by the IPCC about external forcings is important as it disaggregates matters that are often confused or neglected in public and political discourse. Global climate fluctuates naturally through numerous phenomena, but climate also changes through human interference. The United Nations Framework Convention on Climate Change (UNFCCC) states in Article 2: “‘Climate change’ means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition

to natural climate variability observed over comparable time periods' (UNFCCC 1994).

For the sake of clarity this study tries to distinguish between climate change and climate variability: 'Climate change' in reference to changes that are induced by human activity, such as the emission of greenhouse gases and aerosols, that are shifting the atmospheric composition, and thus change the 'incoming solar radiation and out-going infrared (thermal) radiation' (IPCC 2007), causing what is commonly referred to as the greenhouse effect. 'Climate variability' will be used with regard to naturally occurring changes in global climate, meaning caused without human activity. According to the IPCC, human impact on global climate since the beginning of the industrialization, exceeds the natural processes of climate variability (IPCC 2007).

It is necessary to state that despite the IPCC's standing as a scientific authority in the study of climate change, its reports and assessments have recently caused controversy. The IPCC, which compiles the results of many scholars into their synthesis reports, has come under scrutiny over the prediction that the Himalaya glaciers could possibly melt away as early as 2035. In a statement the IPCC confirmed that this prediction was wrong and not based on rigorous scientific modeling. Nonetheless, the IPCC in the same statement affirmed that its conclusions, that 'Climate change is expected to exacerbate current stresses on water resources from population growth and economic and land-use change, including urbanization' is still scientifically verified and remains unchallenged (IPCC 2010). Thus, it remains recognized that:

On a regional scale, mountain snow pack, glaciers and small ice caps play a crucial role in freshwater availability. Widespread mass losses from glaciers and reductions in snow cover over recent decades are projected to accelerate throughout the 21st century, reducing water availability, hydropower potential, and changing seasonality of flows in regions supplied by meltwater from major mountain ranges (e.g. Hindu-Kush, Himalaya, Andes), where more than one-sixth of the world population currently lives (IPCC 2010).

Climate change, due to greenhouse gas emissions, will particularly affect the variability of water resources globally. The increase of global surface temperature, through the greenhouse effect, is expected to increase the 'atmospheric water-holding capacity' (Min et al. 2011), among others because of increased evaporation. That means scientists expect changing patterns of precipitation 'in the intensity, frequency, and dura-

tion of events' (Trenberth et al. 2003: 1205), because the amount of water in the air is increasing. As a consequence, floods will become more frequent, due to more-intense, heavy precipitation. At the same time droughts will become more frequent as well, with more and more water vaporizing from the land into the air. It is difficult to attribute droughts to climate change/variability by excluding natural climate variability, because both factors interact (cf. Le Houérou 1996). The same is true for precipitation changes (Allen and Ingram 2002: 231). But recent studies seem to confirm that human induced climate change already contributes to today's 'more-intense precipitation extremes' (Min et al. 2011) and can be attributed to recent floods and, thus, to increasing the risk of floods (Pall et al. 2011).

As mentioned throughout, considering the complexity of global climate it would be a show of poor judgment to isolate climate change as a single cause of weather events. Pall et al. discuss this matter related to recent floods in the UK:

Recent widespread UK floods—such as in spring 1998, autumn 2000, winter 2003 and summer 2007—have prompted debate as to whether these particular events are attributable to anthropogenic climate change. This is an ill-posed question, given uncertainty in the antecedent conditions; many untraceable factors, anthropogenic or natural, may have contributed to any individual event. Indeed, observed UK fluvial-flood and high-flow trends for recent decades suggest no clear evidence for any change above that of natural variability, mirroring the mixed picture in observed precipitation changes (Pall et al. 2011).

Nonetheless, climate change seems to considerably contribute to climate variability. Researchers working with Pall approach the problem from a new angle and investigate not causality as such, but ask 'what fraction of the event probability is attributable to the anthropogenic drivers' (Pall et al. 2011). By modeling an attribution framework, which is focusing on greenhouse gas emissions only, Pall et al. are able to show 'that it is very likely that global anthropogenic greenhouse gas emissions substantially increased the risk of flood occurrence in England and Wales in autumn 2000' (Pall et al. 2011).

Climate is a global phenomenon that affects all countries and regions in the world to a different extent. The general trend suggests an increase in global surface temperatures, but climate data of the twentieth century shows that Africa is and will continuously be warming faster than the

global average. Scholars are certain that there will be no generalized, single effect of climate change/variability on Africa, because of the long geographical stretch of the continent. Collier, Conway and Venables claim two regional patterns of changing climate for Africa. Northern and Southern Africa will become much hotter (min. plus 4°C) and drier (about 10-20 per cent less rain). Eastern and Central Africa will experience increased rainfall by about 15 per cent. In general more regions will frequently suffer from droughts and floods (Collier et al. 2008b). This is inline with the predictions of the IPCC (Boko et al. 2007: 444-46). In a study for the Nordic-African Foreign Ministers Meeting in 2009, Brown and Crawford further disaggregate the IPCC data. They describe four regional patterns for climate change/variability impacts on Africa. Decreasing rainfall at the Mediterranean coast (North Africa) by 20 per cent and a possible increasing of temperature by 9°C; increase in rain by seven per cent in East Africa; less rain in Southern Africa's extreme west, with a temperature rise between 3.7°C to 7°C. For western Africa predictions are unclear. Higher rain through shifts and increases in the West African Monsoon are possible (Brown and Crawford 2009: 9). In addition, all costal areas in Africa are currently affected by erosion, flooding and subsidence (caused by exploitation and overpopulation), which is likely to increase further due to climate change/variability (Simms 2005: 13). But again scholars are uncertain to associate climate events to climate change or climate variability. An example are discussions regarding droughts in the Sahel zone. Le Houérou points out that the Sahel is frequently affected by droughts, but scholars are undecided whether climate change had any influence on the severity of these droughts (Le Houérou 1996).

Considering the expectation of more frequent droughts and floods, the forecast of river flows and its interaction with extreme variation in precipitation becomes crucial. In recent studies climate scientists are debating if the current models are giving a sufficient estimate of future precipitation, and argue even that current 'models seem to underestimate the observed increase in heavy precipitation with warming' (Min et al. 2011: 378). Consequently, the prediction of river flows becomes even harder. The real effect on flow of the river systems in Africa is apparently unpredictable. Nevertheless, specialists estimate that in drier areas a decrease in rainfall by 10 per cent would have a severe effect on the river system like the Zambezi and Limpopo in southern Africa. The dynamics in fresh water systems are fundamental to the connection that climate change/variability and society share, because it 'is likely to affect the volume and timing of river flows and groundwater recharge,

and, thus, affect the numbers and distribution of people affected by water scarcity' (Arnell 2004: 31).

Already today the world is experiencing a global water crisis. Arnell writes that 1400 million people inhabit river basins that suffer from water stress (defined as 1000m³ /capita/year (Arnell 2004). The origins of this crisis are well known (Biswas 1993; Falkenmark 1990; Swain 2004) and are not limited to climate factors alone. UN agencies estimate that approximately 900 million people live without access to clean drinking water sources and over 2.6 billion people lack adequate sanitation (WHO 2010). The magnitude of people affected by the current water crisis emphasizes that it is growing into an issue of a common global concern, and the situation is expected to get worse (Gleick 2009), in particular though climate change/variability.

In many ways it is the variability of water resources that connects climate change/variability to multiple 'hard' and 'soft' security issues.¹ Hence, it even raises the question if climate change/variability is a cause of armed conflict.

1.2 Climate Change/Variability – The Security Issues

Climate change/variability is becoming a matter of geopolitical concern and has changed the discourse in international politics, bringing the conservative military security paradigm into the debate. One aspect of the discussion is about the anticipated ice-free Arctic and, thus, the chance to exploit arctic oilfields. This involves actors like Russia, Canada, Norway and the USA, who all neighbor the Arctic.

The interstate dimension clearly dominates the classic security debate. And thus, one of the most serious emerging challenge lies in the future of existing water sharing agreements since the water in these basins will vary more frequently and severely, because of changing climate dynamics. Challenges are expected with extreme glacier melting, while in other regions droughts and meteorological disasters are the major threat. The melting of glaciers will impact especially on some

¹ The term 'hard security issues' refers to more traditional military security concerns, while 'soft security issues' includes also those security concerns as food security, health security, environmental security etc. With the end of the cold war and the abolishment of the extreme military block confrontation the political space allowed the salience of these soft security issues.

of the major Asian river basins such as the Ganges Basin (Nepal, India and Bangladesh), the Indus Basin (India and Pakistan), and the Mekong River (China, Burma, Thailand, Laos, Cambodia and Vietnam). At present water is one of the main issues between India and Pakistan, with India securing water resources for its growing metropolis areas. Also China requires huge amounts of water to supply its immense economic growth. This has severe affects for lower riparian states along the Mekong, which experience extreme water supply variability, because of the construction of major dams on the Chinese side. Mekong, Indus and Ganges are additionally experiencing severe floods through heavy rains, as seen in 2010.

Progressing desertification through increased vaporization and changing rain patterns are a cause of concern for the riparian's in the Jordan Basin (Lebanon, Syria, Israel, Jordan and the 'West Bank'), Aral Sea Basin (Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, Afghanistan), Chad Lake Basin (Niger, Nigeria, Chad, Cameroon, and Central African Republic), Zambezi Basin (Zambia, Angola, Zimbabwe, Malawi, Tanzania, Botswana, Mozambique and Namibia), and not least the Nile Basin (Rwanda, Burundi, Congo, Tanzania, Kenya, Uganda, Eritrea, Ethiopia, Sudan and Egypt) (cf. Swain forthcoming 2011b). The Nile Basin was considered by many water researchers and policy makers as having a high potential to induce water conflicts in the region, due to increasing water demand of its riparian's and the unequal distribution of water and power in the basin (Clarke 1991; Gleick 1993; Swain 1996a). Refuting all these dire predictions and being actively encouraged and supported by the World Bank, the Nile Basin countries came together in 1999 to form the Nile Basin Initiative with an objective to establish a basin based water management institution. Though conflict escalation has been managed in the Nile Basin for sometime, the basin-based cooperation has yet to achieve tangible success.

The geopolitical dimensions and military security consequences of climate change/variability pose a severe challenge to interstate relations of many states. Nonetheless, it is the direct impact on people that is human security aspects that are most worrying. One of these human security factors is food security, which according to experts will be highly affected through the multiple impacts of climate change/variability. One third of the African population is affected by hunger and chronic malnutrition, as well as threats from food crisis and famine (Haile 2005). Agriculture, is a major economic activity in Africa, with approximately 60 per cent of employment coming from the agricultural sector, and in some countries accounting for 50 per cent of the countries GDP; there-

fore making it much more sensitive to climate change/variability than industrial based economies (Collier et al. 2008b). The agriculture sector is very sensitive to changes in climate (especially rainfall). Climate change/variability will consequently lead to more frequent extreme weather events in Africa, such as droughts and floods, eventually affecting productivity and likely leading to food shortages (Haile 2005). Some sources claim that by 2020 the yield for crop in some countries will be halving and that 'net crop revenues [will] fall by 90% by 2100' (Boko et al. 2007: 448; Mohamed-Katerer unpublished: 3). The IPCC also foresees that parts of the Sahara region will be particularly vulnerable, with agriculture losses that total 2-7 per cent of GDP. Western and central Africa will lose about 2-4 per cent, while the impact on Northern and Southern Africa is estimated to be about 0.4 to 1.3 per cent (Boko et al. 2007: 447). Some models suggest a decrease of suitable rain-fed land for crops, and an increase in arid or semi arid land by 5-8 per cent by 2080. The report claims that wheat production would likely disappear from Africa and that maize production in southern Africa would be notably reduced (Boko et al. 2007: 448). Despite the major negative impacts of climate change/variability on Africa there will be some regions benefiting. Ethiopian highlands and Mozambique are likely to gain longer growing seasons through the changed climate (Boko et al. 2007: 448).

Sea-level rise is particularly threatening to some of the smaller Island states, such as the Maldives in Indian Ocean and many small Pacific Islands. But it also threatens the sources of livelihood for millions of people that live in low lying river deltas, for example the Mekong Delta in Vietnam, the Ganges-Brahmaputra Delta in Bangladesh, the Amazonas Delta in Brazil, the Nile Delta in Egypt, and the Zambezi Delta in Mozambique. Rich and developed states will be able to mitigate the impact of rising sea levels, for instance London with the Thames Barrier. Others have long-lasting experience with seawater intrusion e.g. Netherlands which shields parts of its inland through the Oosterscheldekering (Eastern Scheldt Storm Surge Barrier). **But, the situation is quite precarious for poor developing regions.**

Three major factors that are associated with the threats of sea-level rise along coastal areas:

- 1) Sea-level rise will reduce the living space for people and cause forced displacement to other regions.

- 2) Saltwater intrusion will pose a severe threat to river ecosystems and also make agriculture nearly impossible with the salinization of soils and water systems.
- 3) Sea-level rise will cause erosion and thus destroy infrastructure (streets, harbors, living space etc).

Of course, the rising sea level will affect African countries in varying ways, as coastal areas are differently developed and populated. Significant effects are however, expected in the Nile Delta, in Ghana and in Gambia. Floods will affect the infrastructure all over Africa increasing pressure on state budgets (Collier et al. 2008b). Health effects of climate change/variability pose another security threat (McMichael et al. 2006). In Africa an increase in high temperature mortalities is expected as well as the increase of disease carrying insects (Pascual et al. 2006).

1.3 Climate Change/Variability – The Conflict Connection

Many argue that conflicts will increase due to the impact of climate change/variability, though not through a direct singular causal mechanism. In the specific context of armed conflict, Wallensteen and Swain identified in the 1990s: (a) environmental destruction as the repercussion of conflict and (b) environmental destruction as the cause of conflict itself (Wallensteen & Swain, 1997). The debate, which evolved prominently during the 1990s, frequently refers to population migration as one of the key linking points between climate change/variability and armed conflict. The anticipated increase in the number of climate change/variability migrants will cause stress on receiving communities, which might themselves suffer under resource stress, and, thus, eventually lead to new security problems through increased competition (Swain, 1996; Salehyan, 2005; Buhaug & Urdal, 2009).²

Some preliminary research finds quantifiable connections between climate change/variability and organized communal conflicts/violence. Theisen's research on scarcity and organized violence in Kenya con-

² But dissent remains on the question if the consequence of climate change/variability is armed conflict. Some authors have argued that climate change/variability will affect mainly the poorest and least powerful parts of society. Thus, it would affect people 'less capable of waging significant conflicts to redress grievances against neighbors and governments' (Raleigh et al. 2008: 2).

firms climatic effects on conflict. His disaggregated quantitative study combines climatic and societal indicators in a small geographic grid of cells. The tentative findings show that following wetter years conflict risk rises, however heating might increase conflict risk as well. Densely populated areas increase risk of conflict (but just during election years), as do multi-ethnic and less developed areas (Theisen 2010). Raleigh and Kniveton confirm the trend of high rainfall leading to increased risk of localized communal conflict in Kenya (Raleigh and Kniveton 2010). However, the findings indicate that multicausality of climate change/variability factors with many other factors leading to conflict. Thus, it must be regarded with caution when Burke et al. claim that ‘historical linkages between civil war and temperature in Africa’ exist when looking at climate variation and conflicts in the timeframe of 1981 to 2002. They predict an increase of 54 per cent in armed conflict in Africa by 2030 (Burke et al. 2009).

As Salehyan unambiguously argued in 2008: the discussion regarding the causal relationship between climate change/variability and conflicts has yet to produce consensus (Salehyan 2008). Nonetheless, the German Advisory Council on Global Change identified in 2007 three key findings that conform with the findings of the majority of researchers:

- *Multicausality: All approaches emphasize the multicausality of the conflicts observed. There is a consensus that environmental degradation is always only one of several complexly connected causes of conflict and that environmental degradation rarely seems to be the decisive factor.*
- *Locality: There is also a consensus regarding the locality of the conflicts believed to involve an environmental element. They are predominantly intrastate conflicts; even when they can be categorized as cross-border conflicts they are generally not classical interstate conflicts in the sense of large-scale wars between countries but rather regionally limited clashes at the sub-national level, such as between states that border on the same rivers and lakes.*
- *Problem-solving capacity: Finally, all the approaches emphasize the central role of a state’s or society’s problem-solving capacity with regard to the emergence and management of conflicts: in places where political and societal institutions are weak, there is a proportionally higher probability of conflict occurring. Future crisis hotspots are therefore assumed to be lo-*

cated in countries and regions considered problematic in terms of their problem-solving capacity (German Advisory Council on Global Change 2007: 30).

On the basis of the existing literature it can be safely argued that climate change/variability may not generate conflicts in itself, but that climate change/variability can, and in some instances already does, act as a ‘threat multiplier’, i.e. it interacts with other factors (complex societal dynamics, politics) towards causing conflicts. Having that view, this study attempts to identify areas in the Zambezi River basin that are prone to the risk of climate induced violent conflicts (collective violence, popular unrest).

2

Socio-Economic and Political Dimensions

2.1 The Impact of Climate Change/Variability on the Socio-Economic System

In the economic literature, the effect of climate change/variability on aggregate economic activity has been broadly enumerated using two methodologies. The first approach uses growth and development theories to examine the relationship between average temperature and aggregate economic variables in a cross-section of countries (e.g. Sachs and Warner 1997; Gallup et al. 1999; Nordhaus 2006). Empirical research on cross-sectional data of the world shows that countries in warmer climates tend to be poorer.³ The second is the Integrated Assessment Models (IAM), which on the other hand relies on micro-evidence to estimate the various climatic effects and then aggregates them to impute the net impact on national income. They are widely used in the climate change/variability literature to model the interactions between the climate and the economy. However, there are multiple mechanisms through which climate change/variability may impact economic outcomes and interact with other factors.

Given these complexities, aggregating the impacts and their interactions on the macroeconomic outcomes becomes very challenging. Micro level climate literature, suggests a wide range of climate change/variability effects, including influences on agricultural productivity, mortality, crime, and social unrest etc., most of which are not accounted for in implemented quantitative models. Recent research finds that in poor

³ Some researchers dispute this, arguing that this correlation is spurious and is due to the correlation of climate change/variability with other factors such as country level characteristics for instance, institutional quality etc. (e.g., Acemoglu, Johnson, and Robinson 2002; Rodrik, Subramanian, and Trebbi 2004).

countries, higher temperatures in a given year reduce the growth rate of GDP per capita (Dell et al. 2008). Dell et al. show that an increase of one degree Celsius is associated with a decline of 8.5 per cent in national income (Dell et al. 2009). Investigating further, Jones and Olken find that higher temperatures in poor countries, lead to large negative impacts on the growth of their exports (Jones and Olken 2010). Their results suggest that with a rise of one degree Celsius in a given year the growth of that country's exports decrease by between 2.0 and 5.7 percentage points. The negative impact is substantial on agricultural exports and light manufacturing exports, with little effects on heavy industry or raw materials production.

There is substantial economic literature on the impact of climate change/variability on the economy that empirically documents the effect of climate on agriculture, labor productivity, crime and social unrest, and health.⁴ Paradoxically, Africa remains a marginal contributor to climate change/variability but the most vulnerable to it. This vulnerability may be viewed as a function of the sensitivity of agriculture to changes in climate, the adaptive capacity of the system, and the degree of exposure to climate hazards (IPCC 2001: 89).

The economic impact of climate change/variability may be broadly captured as a combination of direct impact, indirect impacts and reduction in future economic activity. As explained in Figure 1, given the agriculture dependent, traditional economies of Africa, higher temperature has a direct impact on the economy through changes in agricultural production and crop yields. It affects the amount of arable land; impacts the length of growing season; changes the yield potential; and impacts the livestock systems (Bruinsma 2003). Climate change/variability induced disruptions in food and water systems, health (heat-related mortality, diseases) and rise in sea levels, adversely affect development and livelihoods. This is further likely to have an impact on economic development of rural poor communities and agricultural productivity, particularly in sub-Saharan Africa (Mendelsohn et al. 2000a; Mendelsohn et al. 2000b; Mortimer and Manvel 2006; Howden et al. 2007; Twomlow et al. 2008).

4 For impact on agriculture: Adams et al. 1990, Mendelsohn et al. 2001, Schlenker and Roberts 2006, Deschenes and Greenstone 2007, and Guiteras 2007. For health: Curriero et al. 2002, Deschenes and Moretti 2007, Deschenes and Greenstone 2007, Gallup and Sachs 2001, and Sachs and Malaney 2002. On labor productivity: Meese et al. 1982, and Huntington 1915. On crime and social unrest: Field 1992, Jacob et al. 2007, and Miguel et al. 2004. Many other possible climate-economy channels are discussed in the intergovernmental Panel on Climate Change 4th Assessment Report (IPCC 2007).

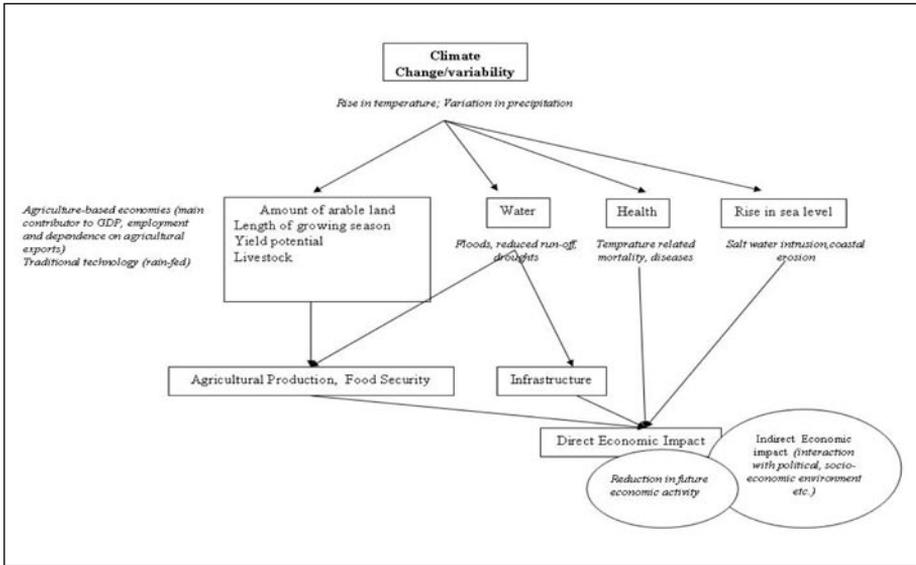


Figure 1: Socio-Economic Impact of Climate Change/Variability

Climate change/variability and its economic impact are not isolated events. Interactions between these economic changes, and existing political, economic, social and security environments might result in further indirect economic impacts. For instance, climate change/variability will reduce the water flow by 10 per cent in the Zambezi and Limpopo basin. This will have a direct impact on crop yields. However, coupled with the presence of HIV/AIDS and conflict, the situation will lead to further economic distress. Researchers also suggest that an adverse environmental impact on the economy might also discourage future investments.

2.2 Political System and Climate Change/Variability

The connection between the political system and its governance of socio-economic impacts of climate change/variability is threefold: 1) with a negative impact on the economy, politics can act as a stressor /catalyst to create conflict; (2) with weak political, economic and social institutions, the resilience of the vulnerable worsens; (3) existence of polarized social identities further deteriorates the situation.

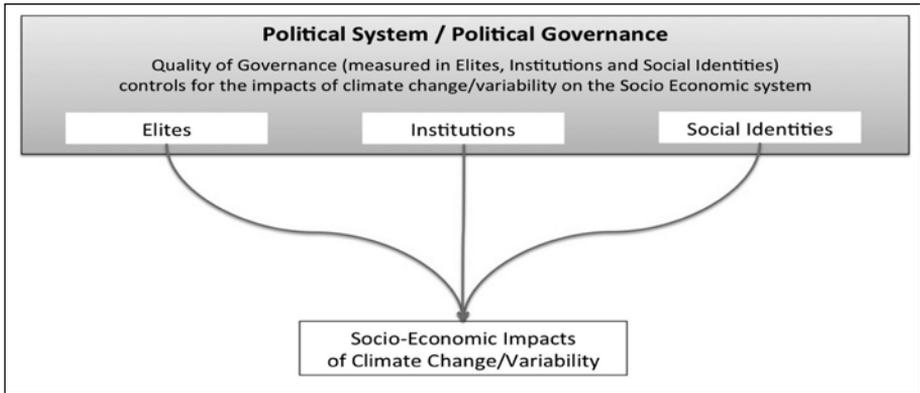


Figure 2: Quality of Governance and the socio-economic Impact of Climate Change/Variability

2.2.1 Elites

Most types of collective violence – be it insurgencies or less organized forms, such as riots and communal conflicts – generally necessitates the active involvement of elites. In fact, most scholars argue that without the presence of resourceful and willing politicians, businessmen, communal or military leaders, a desire amongst individuals to engage in violence is unlikely to transform itself into collective action. Brown, for example, argues that ‘bad leaders’ constitute the single greatest threat to peace and security (Brown 1996: 575). Inspired by economic greed, hunger for power, or ideological or religious fervor, elites function as ‘catalysts that turn potentially volatile situations into open warfare’ (Brown 1996: 571). Similar thoughts can be found in the literature on ethnic mobilization. Gurr is of the opinion that a strong and united leadership is a prerequisite for any ethnic group seeking to politically or militarily challenge a central government (Gurr 2000). Meanwhile, a central tenet of Collier and Hoeffler’s greed theory is that insurgencies are largely the result of deliberate actions taking by rebel leaders to enrich themselves (Collier 2004). By taking to arms, they aspire to capture or seek rent from valuable natural resources. Elites can have an especially detrimental effect in post-civil war societies. With weak state institutions and a hostile security climate, spoilers – ‘leaders and parties who believe that peace emerging from negotiations threatens their power, worldview, and interests, and use violence to undermine attempts to achieve it’ – often have the opportunity and means to sponsor or engage in different sorts of violence (Stedman 1997: 5).

There are two main reasons for why elite involvement tends to be a prerequisite for collective violence to take place. First, individuals

at the lower echelons of society seldom have the resources and skills needed to finance and co-ordinate violent acts of a collective nature. Not only do people need to be fed, armed, and at times paid, they must also be organized in an efficient manner. Second, people are usually very susceptible to who seeks to mobilize them. According to Bhatia and Muggah ‘combatants can distinguish between illegitimate and legitimate mobilization’ and ‘choose ‘who’ can demand mobilization’ (Bhatia and Muggah 2009: 142). It can be argued that elites are more likely to be accepted as legitimate mobilizers, since there is a higher chance that they are known to a larger segment of the population. This is particularly true if they are also believed to be representing the interest of the wider community. By utilizing ethnic, political, economic or military networks, they can generate the necessary feelings of affinity, trust and even fear to convince men and women to fight for them (Themnér forthcoming 2011).

It is foremost national elites that possess the greatest capacity to initiate collective violence. Not only do they usually control larger patronage networks within the country – whereby they can generate greater resources and have more followers at their disposal; they are also often entrenched in the central institutions of the state. As such, they may have state revenues, not to mention the police, army, secret services and civilian branches of the administration, at their disposal. Other national elites may have access to other types of formal organizations – ranging from political parties and interest groups, to businesses and religious associations – that can also be used as venues for violent enterprises.

Moving on to local elites, they can also have a negative effect on security dynamics. Research has found that less organized forms of violence, such as riots, are usually sponsored by local dignitaries (Varshney 2002: 10-11). In addition, it is not uncommon that actors such as paramount chiefs, village elders or local representatives of political parties incite violence. In Ethiopia, for example, Afar village elders were involved in the planning of armed attacks against their Issa neighbors in 2002 (Markakis 2003). Such acts of violence can at times be an extension of national disputes, whereby chiefs and communal leaders align themselves with national patrons, or, be purely localized affairs concerning the control of local resources. Even if sub-national leaders can, at times, utilize formal organizations to sponsor violent actions – such as local branches of political parties, youth clubs or municipality institutions – they are often dependent on more informal networks. For instance, by utilizing ethnic ties, the Afar elders mentioned above,

were able to convince village youths to engage in communal conflict (Markakis 2003).

The question is, however, why we should expect an increased risk of conflict in communities who both have ‘bad leaders’ in their midst and are affected by climate change/variability? There are three plausible explanations for this.

First, if climate change/variability results in a substantial decrease in resources such as water and thus, the loss of land for grazing and agriculture, there may be heightened competition between elites, and local communities, over their exploitation. This is especially true if local and national dignitaries are dependent on such resources to uphold their patronage networks. During such rivalries it may be tempting for elites, like in Ethiopia in the 1980s, to mobilize their clients against the interest of other elites, at worst escalating into open violence.

Second, politicians, businessmen or communal leaders can have incentives to organize violent acts even though they are not personally affected by climate change/variability. For political or economic reasons of their own, they may, like in Pakistan, manipulate people’s fears of economic and social marginalization – due to food insecurity, droughts or floods – in order to mobilize support against other elites.

Thirdly, elites can even have incentives to use access to food and water as a political tool. They can do so by channeling scarce resources to their own followers and withholding them to those of their adversaries’, they may hope to gain concessions from the latter. This was observed in Cambodia, Bangladesh, Sudan, and many other cases.

2.2.2 Institutions

The role that institutions play in terms of risk coping, adaptation capacity, and resilience of states and societies to climate change/variability is crucial. As the examples of water sharing agreements and river governing commission’s show, the institutions can be the tipping point between cooperation or confrontation.

Just as economic grievances and the actions of malign elites can have a detrimental effect on security, so can the presence of weak state institutions that are unable to provide social goods and services to its citizens. The strength of state institutions often erodes due to two interlinked processes. First, external pressures – such as withdrawal of foreign aid or patronage, price shocks or falling commodity prices – can undermine the ability of the central and local governments to finance the security forces, health sector, court and educational systems,

as well as to uphold vital infrastructure (Brown 1996: 576). Second, internal dynamics can also affect the quality and reach of state institutions. Periods of political transitions and economic mismanagement can lead to institutional disorder and further damage the government's ability to carry out the most basic functions (Brown 1996: 576). At worst, government leaders and officials purposely seek to dismantle state institutions, creating 'shadow states' that leave citizens 'less secure and more materially impoverished'. By doing so leaders aim to 'encourage individuals to seek the ruler's personal favor to secure exemption from these conditions' (Reno 2000: 46-47).

There are two foremost causal paths by which weak institutions can lead to an increased risk of violence. If local communities do not have access to water, food, security, healthcare or educational facilities, there is an acute danger that they will become aggrieved. This is especially true if they have previously been accustomed to receiving such goods and services from the state, or if they have had expectations of improvements in these areas in the near future (Gurr 1970). Such feelings of injustice are often correlated with the outbreak of armed action. Research has, for instance, shown that people's feelings of economic and social marginalization is usually at the heart of most violent enterprises (Zartman 1995; Bøås and Dunn 2007; Ohlson 2008). Considering the central role that institutions have in providing social services to communities, we should expect dysfunctional state structures to at least indirectly affect the prevalence of collective violence.

Another problem with weak institutions is that it creates uncertainties about where the country is heading and the rules of acceptable political behavior. Such uncertainties can, at worst, push or tempt different actors to resort to violence. This is especially true in societies that undergo transitions from authoritarian to democratic modes of governance or that are recovering from protracted armed conflicts. Hegre et al., for example, hold that semi-democracies are positively correlated to the outbreak of civil wars (Hegre et al. 2001). The reason for this is that while semi-democratic institutions on the one hand are open enough to invite to protest, enough authoritarian tendencies remain to generate violent repressions against open dissent, which in return can lead to rebellion. In semi-democracies ambiguities concerning laws and norms are, however, seldom confined to the state's right to employ violence. Reformed media laws may, for example, tolerate private newspapers and TV-channels, while at the same time allowing the state to retain clauses of censorship. Similarly, judges appointed by the previous authoritarian regime, may impede efforts to reform the

judicial system. Such quasi-reformed institutions also have the potential to reinforce political and constitutional vagueness. Meanwhile, the capacity and neutrality of state structures is often of major concern in post-war countries. Since most rebel forces contest the legitimacy of government institutions during war – and actively seek to destroy them – state structures tend to be weak in societies emerging from civil wars. This, together with the fact that such institutions may have been used to commit atrocities during the previous hostilities, means that formal institutions are often ill placed to ensure the security and wellbeing of citizens. This can, at worst, create incentives for different actors to arm themselves and resort to violence.

Depending on their position in society, elites and ordinary citizens may react differently to periods of democratization and weakening of institutions. Elites that control the state apparatus may feel vulnerable and fear a loss of power. The same is true for social groups that have traditionally been close to the center of power, whereby they have had disproportional access to public resources. Rather than risk marginalization, both of these groups may have incentives to pre-emptively employ violence to scare off potential challengers; especially during times of elections (Brown 1996: 576, 86; Gurr 2000). For others, fragile state institutions and the opening of the political space may offer an opportunity to confront structures that are perceived as oppressive or unfair. This is especially true for oppositional elites and marginalized groups who previously lacked access to the central decision-making process. At worst such mobilization can turn violent (Gurr 2000; Hegre et al. 2001). In some situations weak institutions and political liberalization can, however, lead to violence even though elites and social groups do not actively seek it. For instance, in cases of state disintegration – the former Soviet Union and Yugoslavia being two extreme cases – where central governments are believed to lack the capacity to ensure security, ethnic groups may be motivated to apply unilateral measures to protect themselves. Even if these actions may have defensive intentions – setting up local watch-groups or militias to guard specific neighborhoods – it may generate reciprocal actions from other groups; at worst degenerating into a security dilemma that can easily trigger collective violence (Brown 1996: 576).

Based on the reasoning above, there are arguably two manners in which climate change/variability and weak institutions can interact to reinforce the risk of violence. First, alterations in temperature and precipitation are likely to affect the socio-economic systems particularly hard when there are weak institutions. Low administrative capacity and

insufficient infrastructure means that it will be difficult for national and local institutions to distribute food, water and health supplies to exposed areas. This may not only undermine the legitimacy of the state, but also exasperate communal conflicts between groups competing for scarce resources, as recently seen in Pakistan after the 2010 floods.

Second, frail institutions are also less likely to have the capacity to regulate and control climate-induced tensions in a peaceful manner. If state structures are deemed as weak and partial, elites have incentives to use unconstitutional measures – such as acts of violence, human rights abuses and electoral tampering – to solve disputes between themselves. Similarly, local communities – engaged in resource disputes with other communities – may take matters into their own hands. Rather than entrusting the authorities to guard grazing areas, farmland or freshwater supplies, they may feel pressed to ensure access to these resources by arming themselves. At worst, there can even be interaction-effects between climate change/variability and weak institutions: fragile state structures have problems coping with the effect of climate change/variability, increasing levels of poverty, undermining state legitimacy and increasing societal tensions, which in turn further weakens the capacity and reach of institutions.⁵

2.2.3 Social Identities

Even if economic problems, bad leaders and weak institutions constitute vital ingredients for armed action to take place, most forms of collective violence are also dependent on a common social identity that bind people together. Klandermans, for instance, argues that ‘aggrieved people might have the resources and opportunities to protest, but they still need to construct a politicized collective identity to engage in collective political action’ (Klandermans 2003: 675). It is through the lens of a common identity – be it ethnicity, religion, class, ideology, regionalism or something else – that aggrieved individuals come to the conclusion that they are facing a common problem, which they can collectively work to overcome (Tilly 1978; Zartman 1995: 5; Ellingsen 2000; Gurr 2000). It is usually by tapping into the shared perceptions of injustice and marginalization within such social groups that elites are able to

⁵ For an extended discussion on the theoretical dynamics of environmental and societal security issues see cf. Roland Kostić, Florian Krampe, and Ashok Swain, ‘Liberal Statebuilding and Environmental Security - the International Community between Trade-Off and Carelessness’, in Ramses Amer, Ashok Swain and Joakim Öjendal (eds.), *The Development and Security Nexus* (London: Anthem Press, forthcoming, 2011).

mobilize men and women both politically and militarily. Such calls for action – either based on a genuine conviction about a just cause or used to hide more cynical motives – often have a strong appeal to wider constituencies (Ohlson 2008: 142). This is especially true in times of insecurity or a growing sense of impending crisis. Describing the societal processes leading up to the outbreak of civil war, Lyons holds that ‘insecurity and the breakdown of larger networks lead people to seek protection in narrower family, clan, ethnic, and religious networks’ (Lyons 2005: 47). The reason for this is that collective identities, such as ethnicity, reduce complexity by providing clearer guidelines for whom to trust and interact with, (especially in the absence of functioning state institutions that can uphold law and order). Hence, at times of societal upheaval identity formation processes can take a life of their own, as different groups begin awarding positive traits to their own members and negative stereotypes to non-members, resulting in increased communal polarization (Tajfel 1974).

Once individuals have internalized a group identity they are often reluctant to dispose of it. This is particularly the case in the aftermath of civil wars and large-scale killings. Not trusting the new institutions being built or the intentions of opposing groups, citizens may continue to award loyalty to chauvinistic leaders and symbols. As a result wartime identities often continue to flourish long after the cessation of hostilities. Post-war politics and elections may, for example, continue to be dominated by the former belligerent parties who seek to win office by mobilizing the electorate along wartime fault lines, while ex-combatants continue to adhere to their factional belongings (Kostić 2007; Themnér forthcoming 2011). This lack of inter-communal communication, often results in groups having different perceptions of what happened during the war and subsequently also different historical narratives of what constitutes the truth (Lerche 2000). Such divergences can further entrench already polarized communities.

Hardened social identities constitute an especially acute problem when they (a) exist within authoritarian states and (b) are based on not one, but several overlapping identities. Concerning the former, Sambanis, for example, finds that armed conflicts along ethnic lines are especially likely to erupt in societies with undemocratic systems of governance (Sambanis 2001). Due to their authoritarian tendencies such institutions often discriminate against ethnic minorities politically, providing ethnic entrepreneurs with an opportunity for mobilization. Meanwhile, the theory on crosscutting memberships holds that if a collective of individuals share several overlapping identity markers

– whereby they are simultaneously part of several social groups – they are less likely to have moderate attitudes and take restrained actions (Lijphart 1977: 75-76). There is, hence, a greater risk of political mobilization when, for example, an ethnic group not only possesses a salient cultural and historical identity, but also predominantly belongs to an underprivileged class.

How then can polarized social identities and climate change/variability interact to create a more conflict prone situation? One causal path that this can take is that food and water scarcity – induced by climate change/variability – is likely to create feelings of uncertainty about the social and economic sustainability, if not survival, of local communities. In such instances, it could be presumed that already polarized communities will – in line with Lyons’ argument – be even more likely to adhere to and seek sanctuary in narrower “family, clan, ethnic, and religious networks,” rendering inter-group cooperation null and void (Lyons 2005: 47). Resource scarcity and competition may, in other words, be the straw that breaks the camel’s back. This is particularly true in situations where climate change/variability affects groups with overlapping, reinforcing identities. With few crosscutting cleavages, communal groups may come to the conclusion that members of other groups constitute the main obstacle for their economic and social wellbeing, creating incentives for armed action.

2.3 Interaction of Climatic, Socio-Economic and Political Factors

Climate change and climate variability will inevitably have tremendous impact on the livelihood of societies and pose challenges to national and regional security. As argued above climate change/variability can have a catalyzing affect on the cause of social unrest and armed conflict. However, climate change/variability will not do so on its own, but in interaction with the socio-economic and political system. Socio-economic impacts emerge from climate change/variability effects on food and water resources that are critical for livelihoods and survival across developing countries (particularly Africa).

As figure 3 suggests, the quality of governance, particular elites, institutions and social identities, is crucial for societies, as it has the ability to control the impact of climate change/variability on the socio-economic system.

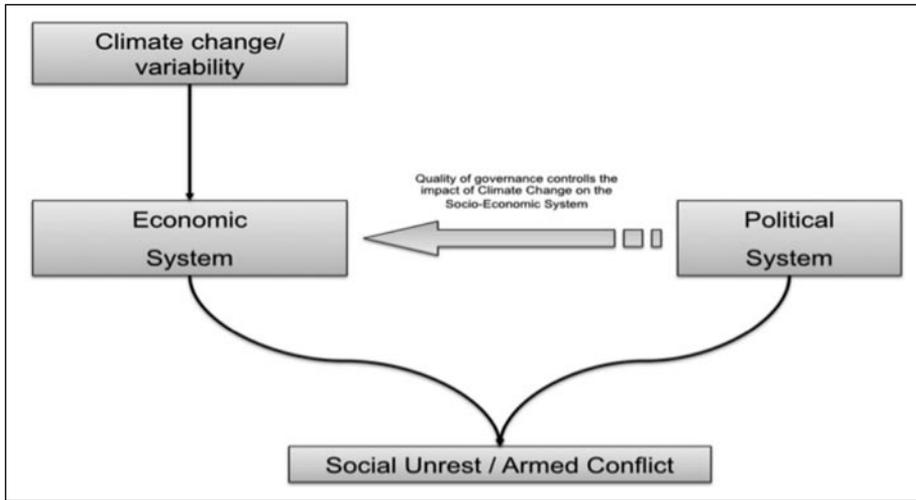


Figure 3: Climate Change/Variability, the Socio-Economic System and Political Governance

In a situation where the political system and institutions fail and social identities are protracted, the presence of climate and environmental stressors is likely to intensify an existing distressful condition and lead to a further negative impact on the livelihood of a household, individual or social group, making them more vulnerable.

The weakening institutions cause two interrelated problems: a) failure to distribute certain goods and services (food, water, medicine) to affected communities, increase feelings of neglect, b) weak institutions create feelings of uncertainty amongst local communities, as well as amongst national and local elites about their position in societies.

In these situations elites can have incentives to play on the fears/feelings of marginalization amongst polarized groups. A society with strong institutions may be able to handle these pressures/spoilers, but it may not be possible in societies with weak institutions: a) such weak institutions have a difficult time channeling political mobilization in a peaceful way, b) such institutions (especially if semi-democratic) may even engage in oppressive measures of their own (security forces), increasing the risk of conflict.

3

The Zambezi River Basin

The 3.500 kilometer long Zambezi River dominates Southern Africa. Its basin stretches over eight states, and is an important geopolitical factor for southern African politics. Moreover, it is a source of life for the millions of people that depend on the river as a source for food. The Zambezi source, which is located northwest of Mwinilunga, Zambia, became a UNESCO World Heritage site in 2009 because: ‘The Zambezi basin constitutes one of Africa’s most important natural resources. It is an important habitat as far as biodiversity is concerned’ (UNESCO World Heritage Centre 2009).

The Zambezi basin is the fourth largest basin in Africa and stretches from the eastern parts of Angola and north western Zambia towards the Indian Ocean crossing or receiving water from riparian rivers of six more countries (Namibia, Botswana, Zimbabwe, Malawi, Tanzania and Mozambique). The Environmental Information Portal (EarthTrends) describes the basin area as 1.3 million square kilometers, by 2002, covered with 4 per cent forest (43 per cent original forest has already been lost) and 20 per cent cropland. Of the total area, the deforestation rate accounts for 9 per cent and eroded areas for 2 per cent (World Resources Institute 2002).

In addition to the geographical facts of the basin, the countries that heavily depend on the Zambezi river system share a complex historical and political development during the twentieth century. The eight countries are hosting a population of approximately 128 million.⁶ With regards to human development all of these countries are categorized as being of low or medium development. In the following sections of this study the geographic and climate profile of the Zambezi Basin will be sketched and the socio-economic structure of the region elaborated

⁶ Excluding Botswana, Namibia and Tanzania, which just share a very small amount of the basin the population number is still over 80 million.

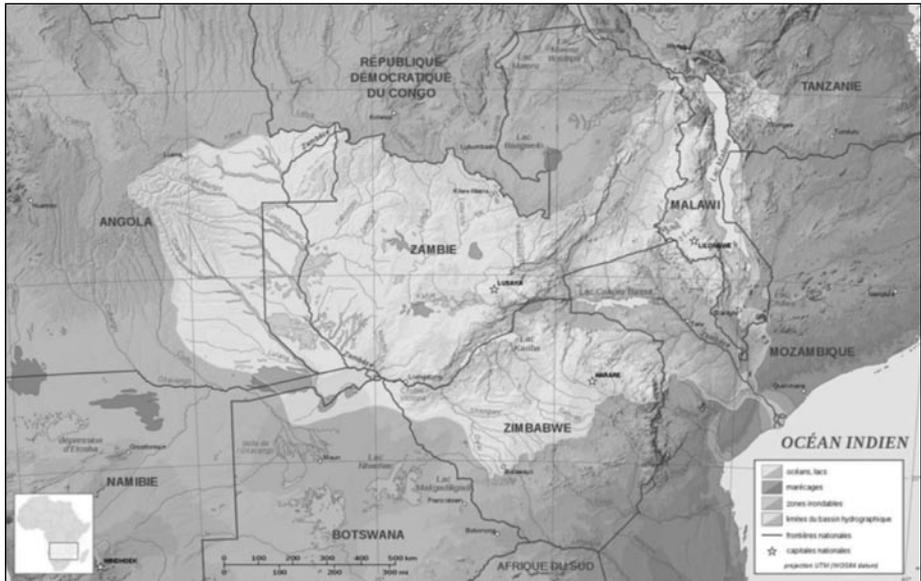


Figure 4: The Zambezi River Basin (Source: <http://mapsof.net/zambia/static-maps/jpg/zambezi-river-basin-fr/full-size>)

upon in detail. At the end, the historical and political context will also be explained.

3.1 The Zambezi Basin and its Geography and Climate

The Zambezi basin is the dominating river basin in southern Africa. Following FAO data, the Zambezi basin accounts for 91.5 per cent of Malawi's, 76.4 per cent of Zambia's, 54.5 per cent of Zimbabwe's, and 20.2 per cent of Mozambique's total land area (see table 1). Although Angola and particularly Tanzania share just a slight margin of the Zambezi basin they contribute significantly to the basin area through their annual rainfall (see table 1).

The Zambezi basin draws the majority of its water resources from the tropical wet mountainous regions of Zambia. This is also the region in Zambia that receives the highest amount of rain during the year (FAO 2005). From Kaleni Hill Road Bridge in the north-western region of Zambia near its source the Zambezi has an average flow of 11.072 m³/s. About 700 km farther south, at the border to Namibia (Katima Mulilo station), it increases to an enormous 1.168.513 m³/s. The area

Table 1: The Zambezi basin: areas and rainfall by country (Source: FAO)

	Total area of the country (km ²)	Area of the country within the basin (km ²)	As % of total area of the basin (%)	As % of total area of the country (%)	Average annual rainfall in the basin area (mm)		
					min.	max.	mean
Angola	1 246 700	235 423	17.4	18.9	550	1 475	1 050
Botswana	581 730	12 401	0.9	2.1	555	665	595
Malawi	118 480	108 360	8.0	91.5	745	2 220	990
Mozambique	801 590	162 004	12.0	20.2	555	1 790	905
Namibia	824 900	17 426	1.3	2.1	545	690	630
Tanzania	945 090	27 840	2.1	2.9	1 015	1 785	1 240
Zambia	752 610	574 875	42.5	76.4	600	1 435	955
Zimbabwe	390 760	213 036	15.8	54.5	525	1 590	710
For Zambezi basin		1 351 365	100.0		535	2 220	930

from Katima Mulilo along the Namibian border of the Caprivi Strip (about 100km) is dominated by major swamp areas with a rich biodiversity. At the estuary of the Chobe River, the Zambezi receives an average inflow of 32.336 m³/s. This area marks a major border point for Namibia, Zambia, Botswana and Zimbabwe (all runoff data provided by Global Runoff Data Centre (GRDC)). Beyond this fourfold border point the Zambezi demarcates the border between southern Zambia and northern Zimbabwe, running through the Zambezi Escarpment, which also forms the Batoka Gorge. Along this border it passes two significant tourist locations, Victoria Falls and Kariba Lake. Zimbabwe and Zambia contribute big shares of the watershed to the Zambezi basin (15.9 per cent and 41.9 per cent). Both states are former British colonies constituting former North and South Rhodesia. Both share the Kariba Dam and reservoir which is managed jointly through the Zambezi River Authority (ZRA) (Beck and Bernauer 2010: 4-5). The Kariba Dam is the biggest water resource for both states totaling 94 km³ and particularly important as the southern regions in Zambia and the northern regions of Zimbabwe receive less rain and suffer from a great variation in rainfall totals and intra-seasonal distribution of rain. In particular, Zimbabwe's north-western regions (northern Matabeleland) receive extremely low amounts of annual rainfall (FAO 2005).

Behind the Kariba dam, the Zambezi crosses the border to Mozambique from which point it fills Lake Cahora Bassa. The Cahora

Bassa Dam is the largest hydroelectric plant in southern Africa, able to produce 2.060 MW, accounting for 80 per cent of Mozambique's hydro-power potential (FAO 2005). The lowlands below the dam are rich in water resources, receiving an additional 16 km³/year of inflow from the northern tributary, the Shire, from Lake Malawi (FAO Land and Water Development Division 1997). At the end of the Zambezi Delta, which has tremendous biodiversity, the Zambezi ends in the Indian Ocean, discharging about 106 km³ of annual discharge (FAO Land and Water Development Division 1997).

The variability of water is of significance particularly in regards to dryland agriculture that dominates the region. FAO defines drylands as those regions classified climatically as arid, semi-arid, or dry sub-humid, based on the length of the growing period (lgp) for annual crops. Thereby dryland agriculture requires irrigation systems and schemes in contrast to areas of rain-fed farming, because it occurs under conditions of moderate to severe water stress.

When looking at the countries of the Zambezi Basin, Botswana and Namibia stand out for having significant dessert areas (Botswana 68 per cent and Namibia 65 per cent). However, the main tributary countries to the Zambezi, Zambia and Zimbabwe, have dominant dry sub-humid dryland areas (87 per cent and 66 per cent), and Zimbabwe has an additional 25 per cent semi-arid drylands. In total, 95 per cent of the basin state areas are classified as dessert or drylands by FAO (see table). Moreover, the FAO has set the risk of desertification to 100 per cent in

Table 2: Agricultural Drylands (Source: FAO/AGL 2003)

	Total area	Desert				Drylands		Drylands	
		Hyperarid		Arid		Semi-arid		Dry-Subhumid	
		lgp 0 days		lgp 1-59 days		lgp 60-119 days		lgp 120-179 days	
Country	'000 km ²	%	'000 km ²	%	'000 km ²	%	'000 km ²	%	'000km ²
Angola	1 248	3	36	1	14	7	85	29	367
Botswana	579	57	342	11	62	31	186	2	10
Malawi	120	0	0	0	0	0	0	71	67
Mozambique	791	5	41	1	9	10	77	15	117
Namibia	819	58	474	7	58	33	274	2	12
Zambia	752	0	0	0	0	0	2	87	643
Zimbabwe	390	8	30	1	2	25	98	66	255
Total	3451	27	923	4	145	21	722	43	1471

Table 3: Agricultural land in the Zambezi Basin Countries (Source: UNSTATS)

Country	Agricultural area in 2007 (km ²)	% change since 1990	% of total land area in 2007 (km ²)	Arable land in 2007 (km ²)	Land under permanent crops in 2007 (km ²)	Land under permanent meadows and pastures in 2007 (km ²)
Angola	575 900	0,3	46,2	33 000	2 900	540 000
Botswana	258 520	-0,6	45,6	2 500	20	256 000
Malawi	49 700	17,8	52,8	30 000	1 200	18 500
Mozambique	488 000	2,3	62,1	44 500	3 500	440 000
Namibia	388 050	0,4	47,1	8 000	50	380 000
Zambia	255 890	10,4	34,4	52 600	290	203 000
Zimbabwe	154 500	18,8	...	32 300	1 200	121 000
Total	2 170 560			202 900	9 160	1 958 500

Zimbabwe and Botswana, 99 per cent in Namibia and 87 per cent in Zambia (FAO Agricultural Drylands Dataset).

In total the countries of the Zambezi Basin (excluding Tanzania) have 2.17 million square kilometers of agricultural land, of which just 202.900 square kilometers are arable, meaning land that can be cultivated to grow crops etc. Notably, Zimbabwe, Malawi and Zambia have increased the amount of agricultural land between 1990 and 2007. With 62.1 per cent Mozambique holds the largest amount of agricultural land in relation to total land area, and with 3500 square kilometers the country has the largest area under permanent crops (see table).

The growth in agricultural land in Zimbabwe seems connected to the decrease in forest areas in the country. Between 1990 and 2007 Zimbabwe lost 23.9 per cent of its forest area. In total, forest area in the region has declined by 11 per cent since 1990, whereas Mozambique and Angola are the only states that lost less than five per cent of forest areas (see table 4).

As a consequence of increased agricultural land there is an increase in need for irrigation to sustain agricultural production and mitigate the variability of rainfall. In the entire basin, agriculture is the dominating consumer of water. Botswana uses just 41 per cent of its water resources for agriculture, while 18 per cent go into mining and energy production. In comparison Mozambique, Namibia, Zambia and Zimbabwe use over 70 per cent of their fresh water resources for agriculture. Mozambique, in particular, uses 87 per cent of its water for agriculture, while just 2 per cent goes to the industrial sector (FAO 2005).

Table 4: Forest Area in the Zambezi Basin Countries (Source: UNSTATS)

Country	Forest area in 1990 km ²	Forest area in 2007 km ²	% change since 1990 %	% of land area covered by forest in 1990 %	% of land area covered by forest in 2007 %
Angola	609 760	588 544	-3,5	48,9	47,2
Botswana	137 180	117 062	-14,7	24,2	20,7
Malawi	38 960	33 360	-14,4	41,4	35,5
Mozambique	200 120	191 620	-4,2	25,5	24,4
Namibia	87 620	75 122	-14,3	10,6	9,1
Zambia	491 240	415 624	-15,4	66,1	55,9
Zimbabwe	222 340	169 140	-23,9	57,5	43,7
Total	1 787 220	1 590 472	- 11		

The dependency on water for food production in the basin area affirms concerns that the Zambezi basin will be strongly affected by climate change/variability. Water allocation issues, population and economic growth, expansion of irrigated agriculture water transfer and climate change/variability are expected to cause consumption of water runoff to rise to 40 per cent by 2025 (Beck and Bernauer 2010). The Mendelsohn study (Mendelsohn 2009) confirms that the impact of climate change/variability will be especially hard on developing countries agriculture sector. At the same time health problems will increase. Magadza outlines the risk of the spread of fly-borne disease with higher temperatures and low standards of sanitation in urban areas (Magadza 1994).

Several studies describe the expected changes in water and precipitation, temperature, sea level rise and extreme weather events. The following section comprises the findings of these studies.

3.2 Climate Change/Variability in the Zambezi Basin

3.2.1 Water and Precipitation

The impact of climate change/variability on the Zambezi basin states is expected to deeply influence the life of its inhabitants, because of expected changes in precipitation influencing water variability. Harrison and Whittington analyze the impact of climate change by 2080 on the Zambezi River basin at Victoria Falls. They are running three different climate models that predict a decrease from 1.6 per cent to 17.6 per cent

of annual rainfall in comparison to the 1960-1991 mean. This will affect the Zambezi annual flow levels between minus 10 per cent and up to minus 35.5 per cent (Harrison and Whittington 2002: 237). Kirchhoff and Bulkley claim that the Zambezi overflows were cyclical in the past, but now are unpredictable and result in highly damaging floods (Kirchhoff and Bulkley 2008) (see also extreme weather section).

West Namibia will experience changes to its arid climate. Magadza's study uses older predictions from before 1994, but they include analysis of the 1991/1992 drought in southern Africa. These predictions suggest that the Namibian coast will likely experience more rainfall (1.5 times of current average), however increased evaporation through increased temperature is equally expected (Magadza 1994: 168).

UNEP reports, in reference to the Zimbabwe Department of Meteorological Service, that the national rainfall deviation is deviating from the mean more frequently. According to the same statistic between the middle of the 1980s until 2000 the rainfall was constantly below the mean (this is the longest deviation below the mean since 1910) (UNEP/GRIDA 2002). In Zimbabwe several perennial streams dried out during the 1991/1992 drought. The structure of irrigation systems in Zimbabwe is according to Madadza very vulnerable to evaporation, thus, a reduction of efficiency of the systems is expected (Magadza 1994: 170). In general the Zimbabwean wetlands will be strongly affected by evaporation. Analysis of reservoirs in northeast Zimbabwe indicates a 49 per cent reduction of surface area between the wet and dry season, while many smaller reservoirs fully dried out. Through climate change/variability a further reduction is likely and will affect agriculture production.

Moreover, the dams supplying cities (Gaborone, Botswana and Bulawayo, Zimbabwe) failed to supply the sites with water during the 1991/1992 drought (Magadza 1994: 171). Southern SADC members suffer from water shortage (RSA, Namibia and Botswana). Zimbabwe, Swaziland and Lesotho are also very dry states, while Angola, Zambia, Malawi and Mozambique are very humid (Bonn International Center for Conversion). Zimbabwe and Malawi suffer under water stress (Kirchhoff and Bulkley 2008). Malawi was hit in 2002 by a major drought. With five million people dependent on food aid, 2/3 of Malawians live below the poverty line (Mohamed-Katerer unpublished: 6). As a result of the decreased precipitation and increased evaporation, hydroelectric schemes will suffer under the reduction of water flow. Studies find that the planned Batoka Gorge hydro scheme, jointly built by Zimbabwe

and Zambia, would be very sensitive to climate change/variability (Harrison and Whittington 2002).

According to Bambaige the expected impact of climate change/variability on Mozambique will result in an increase of mean temperature between 1.8 and 3.2 °C. In addition rainfall will decrease overall by 2 to 9 per cent (Bambaige 2007: 4). On the other hand, in southern Mozambique, current rainfall is more frequent and heavy than compared to the 1979-2002 mean. But the southern region is still prone to droughts: ‘although the rains improved in 2003–2004 after a series of drought years, they were erratic with heavy rains, keeping crop prices inflated until harvest in June’ (Osbahr et al. 2008: 1935). Osbahr et al claim that the annual average precipitation in southern Mozambique will decrease by 10–15 per cent (Osbahr et al. 2008: 1935).

3.2.2 Increasing Temperatures

While precipitation patterns change irregularly between extreme rains that cause floods, or result in a general reduction of annual rain, the temperature in the basin is likely to increase. Harrison and Whittington’s predictions project a temperature rise of about 5.2°C for the Zambezi basin with minimal differences among the seasons (Harrison and Whittington 2002: 237).

According to the Zimbabwe Department of Meteorological Services, Zimbabwe has increasingly seen more hot days between 1950 and 1990 (UNEP/GRIDA 2002). A 1994 study on the social vulnerability to climate change/variability in Zimbabwe finds that particular rural populations are at high risk. By 1994 almost 10 per cent of the population in Zimbabwe faced food-insecurity, even though agricultural production maintained average levels. An increase of temperature by 2°C would cause a decrease of Zimbabwean wetlands from 9 per cent to 2.5 per cent, a 4°C increase would reduce ‘the summer water-surplus zones to less than 2%’ (Bohle et al. 1994: 47). This change of temperature is claimed to affect the agricultural production, particularly for crop yields. Magadza projects that an increase of 4 °C in Zimbabwe will result in a maize yield decline by 20 per cent in the north-east, and 27 per cent in the south-east region, bordering Mozambique (Magadza 1994: 175 and 77). An equal amount of harm is likely to affect the agriculture sector in South Africa and Zambia (Mendelsohn 2009).

Mendelsohn finds that a rise in temperature typically causes smaller farmers to switch from crops to livestock. However, larger farms reduce their livestock as they usually farm beef cattle, which is more sensitive

to temperature increase. Large livestock farms are most vulnerable to warming (Mendelsohn 2009: 11-12). Mendelsohn's finding suggests that the mitigation capacity of smaller household farms is greater than the ones of the larger mono cultural farms. A study by Nhemachena assesses the economic impacts of climate change/variability on agriculture in South Africa, Zambia and Zimbabwe. Their survey of 2000 farming households was related to changes in climate, and finds that warmer and drier climates affect crop production negatively, causing food insecurity. The study finds that mixed-crop farming is less affected by changing climates than mono-cropping (Nhemachena 2010). Southern Mozambique will likely experience temperature increases by 2025 between 1.75–2.25 °C in the summer and 1.25–2 °C in the winter (Osbahr et al. 2008: 1953).

3.2.3 Sea Level Rise and Coastal Erosion

Just one country in the Zambezi basin area has a coast, and that is Mozambique. In Mozambique approximately 13 million people live and work in coastal districts (Chemane et al. 1997: 69). Researchers conclude that rising sea levels, resulting from climate change, will have severe impact on Mozambique's coast. While the entire coastline suffers from sea level rise, the Zambezi basin area is particularly vulnerable, with the coastline retreating or advancing as much as 1.1 meters per year between 1999 to 2004. The harbour town Beira, which lays 200 kilometres south of the Zambezi delta, might be inundated up to 40 per cent by 2100 (Chemane et al. 1997: 77).

3.2.4 Extreme Weather Events

According to UN data on hydrological disasters the number of such events has increased in the last 30 years (see table 5). The UN Statistics office recorded a total of eight hydrological disasters between 1980 and 1989 in countries situated within the Zambezi basin. The number increased to twelve in the next decade and rose further to 77 between 2000 and 2009. Among the most affected countries were Malawi and Mozambique, while the number of people affected by floods was five times higher in Mozambique. In comparison Zimbabwe has almost never experienced large disruptions because of floods (only six in the last 30 years), but as mentioned, has experienced severe and regular droughts.

Heavy rains and cyclones in February and March 2000 in Mozambique led to the worst flooding in 50 years and brought widespread devasta-

Table 5: Hydrological Disasters database (Source: UN Statistics)

	No. of events			Persons affected		
	1980-89	1990-99	2000-09	1980-89	1990-99	2000-09
Angola	1	0	19	100 000	0	783 328
Botswana	1	1	3	12 000	3 500	112 603
Malawi	2	6	15	6 000	417 000	1 159 276
Mozambique	3	3	15	1 000 000	470 000	6 212 111
Namibia	0	0	9	0	0	474 300
Zambia	1	1	11	800 000	1 300 000	2 398 816
Zimbabwe	0	1	5	0	0	265 000
Total	8	12	77	1 918 000	2 190 500	11 405 434

tion to Maputo. The flood directly affected more than one million people. Water and sanitation services were disrupted, causing outbreaks of dysentery and cholera in the country (Douglas et al. 2008: 190). Osbahr et al outline that the rural population is familiar with the variability of weather and agricultural production. However, the severity with which the population was hit by the floods of 1977 and 2001, and the droughts of 1983/84, 1994 and 2003, had a major impact on the rural population. In the Gaza province, through which the Limpopo and Changane rivers flow, more than 380,000 people were displaced and 50 per cent of cereals lost (Osbahr et al. 2008: 1953). Mozambique is unusual amongst many of its neighbors in southern Africa in having a relatively well-developed disaster preparedness plan, operational at the district level, alongside a long-term poverty-alleviation policy (Osbahr et al. 2008: 1953).

Interactions of Zambezi floods and sea level rise in the delta area having a severe impact. Chinde is affected by sea level rise and Zambezi floods (Chemane et al. 1997: 70). In February 2007 about 50,000 to 30,000 people were displaced in the Zambezi basin areas within Mozambique. The roads to Mutarara were cut off.⁷ Flooding along the Zambezi valley displaced 50,000 people, and about 150,000-200,000 people were affected overall. Floods in 2010 were followed by severe drought. In the Mafala neighborhood of Maputo, residents noted both natural and local causes of flooding: although there was less rain overall, rare storms seemed more intense and led to more destructive flooding. The situation became worse due to: a lack of adequate drainage infrastructure; no internal organization in the neighborhood to maintain

⁷ http://www.disasterscharter.org/web/charter/activation_details?p_r_p_1415474252_assetId=ACT-145

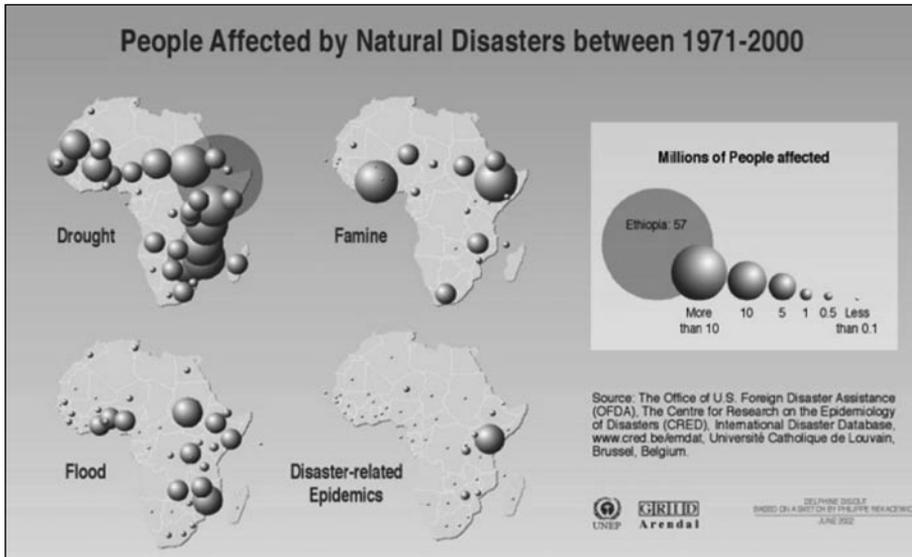


Figure 5: People Affected by Natural Disasters in Africa from 1971 to 2001 (<http://www.fao.org/ag/agl/agll/drylands/mapsafrica.htm>)

drainage channels, manage sewage, allocate land, or assist in evacuation at flood times; an absence of land planning; and no assistance for flood victims. Clearly, the lack of national or local government involvement in developing integrated drainage or in planning the settlement to minimize flood damage is readily apparent. However, there seemed to be no cohesion within the community to organize mutual self-help' (Douglas et al. 2008: 196). Mozambique's coast is prone to tropical cyclone impacts, which are believed to increase due to climate change/variability (Osahr et al. 2008: 1953). The coastal populated area accounts for 40 per cent of the country's total population (Chemane et al. 1997: 69).

The 1991/1992 drought in Zimbabwe gives some indication about the problems that will await the country if it fails to mitigate the affects of climate change/variability. As a consequence of the 1991/1992 drought, Zimbabwe experienced a severe cut back in maize production. As maize is the main food source for Zimbabweans, sporadic violence occurred among others in a township in Bulawayo. The food shortage was predicted by the UNFAO and was also caused by inefficient management through the state. In addition, low levels of water in the Zambezi caused blackouts in Zimbabwe as the Kariba power station was unable to produce energy (Raath 1992). See also (Boston 1992).

3.3 Economic Impact of Climate Change/ Variability in the Zambezi Basin

The economic impact of climate change/variability on Africa is compounded by its agriculture-based economies (agricultural sector accounts for 60 per cent of employment and more than 50 per cent of GDP), use of traditional technology and its dependence on only a few agricultural exports. Climate change/variability is expected to lead to a 50 per cent decline in agricultural output by 2020. This would not only endanger the food security situation but also increase the vulnerability of small-scale farmers. The chronic hunger situation is expected to worsen due to declining water resources, resulting in a 5-8 per cent increase in arid and semi-arid lands by the 2080s (IPCC 2007).

3.3.1 Impact on Agricultural Productivity, Food Security and Droughts

The precarious food situation of the southern African region is the result of various factors including: unfavorable climatic conditions (erratic rainfall, drought and floods); poor and depleted soils; environmental degradation; failed sectorial and macro-economic policies; inadequate support systems; and political upheavals (Van Rooyen and Sigwele 1998).⁸ The subsistence farmers in Africa are especially vulnerable when annual crops fail. This is because, first, locally produced food becomes unavailable or scarce. Second, they cannot purchase food available in the market due to the loss of agricultural income (which is their only source). In recent years, food imports by both governments and the private sector have significantly increased. However, a growing fraction of the southern African population cannot afford food even at subsidized prices. Extreme poverty is further aggravating the situation, resulting in millions relying on relief food.

Analyzing the food situation in southern African from 2001 to 2002, the World Food Program identified factors that are contributing to the food crisis in the region. Two of these seven factors were directly related to climate change/variability. Severe dry spells and drought were

⁸ During normal years South Africa and Zimbabwe are the net food exporters while all the other Southern African countries are net importers. A drought may occur over large areas of southern Africa and still have no major impact for regional food security as long as South Africa and Zimbabwe are not affected. However, when these two countries are affected as was the case in 1992, food has to be obtained from outside the region which takes longer and is costlier.

causing problems for Malawi, Mozambique, Zambia and Zimbabwe. Lesotho, South and Central Mozambique were suffering from heavy rains and floods. Other factors included: disruption to commercial farming in Zimbabwe; depletion of strategic grain reserves in Malawi and Zambia; Poor economic performance in Lesotho and Zimbabwe; and delays with the importation of maize, particularly from South Africa; and sharp rises in prices of staple foods in Malawi, Mozambique, Zambia and Zimbabwe (WFP 2003).

Droughts and floods also have a major impact on the economic health of southern Africa. These natural hazards can frustrate several years of development efforts. For instance, Zimbabwe's GDP fell by 3 per cent and 11 per cent after the 1983 and 1992 droughts, respectively (Glantz et al. 1997). The 1991/1992 drought over southern Africa resulted in crop losses and death of cattle herds, led to widespread food shortages and devastated the fragile economies of various countries. Regional maize production in 1992 was approximately 5 million tons (the lowest since 1961), putting an estimated 30 million people at the brink of famine (Harsch 1992). This was 60 per cent below the 1991 level (an already below average production year) and the 1991-2000 average. In Zimbabwe the drought also resulted in the death of an estimated 423,000 cattle (roughly 10 per cent of total cattle) (Thompson 1993).

In 1995, following a regional drought, the cereal production was only 15.7 million tons while the direct consumption needs were 23.3 million tons. Only half of the previous year's production (9 million tons of maize) was produced in the entire region. This was comparable to that of the early 1960s. Of the 7.6 million ton deficit of all cereals, maize deficits accounted for 4.9 million tons (SADC/FSTAU, 1993). Since 2001, consecutive dry spells in some areas of southern Africa have led to serious food shortages in many countries. In 2001/2002 six countries, namely Lesotho, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe, had a food deficit of 1.2 million tons of cereals, and non-food requirements at an estimated cost of US\$611 million (SADC 2002). The 2002/2003 drought resulted in a food deficit of 3.3 million tons, with an estimated 14.4 million people in need of assistance (WFP 2003).

3.3.1.1 Precipitation Variability

Water-related problems that already exist in the region are likely to worsen as a result of climate change/variability. Increased rainfall will result in an increased incidence of flooding in many areas. Reduced runoff aggravates existing water stress, reduces land quality, lowers quantity of water available for domestic and industrial use, and limits

hydropower production. Agricultural drought (inadequate availability of water for crops) causes 10 to 50 per cent of annual yield losses on 80 per cent of the area planted with maize in southern Africa (Short and Edmeades 1991). Below-normal rainfall years are also occurring more and more frequently, resulting in poor harvests especially due to the lack of early-maturing and drought-tolerant varieties. The shortage of dry-season fodder has also become a major constraint for livestock production, further impacting the food and income security in the region. Even though the climate change/variability on water scarcity may be relatively minor, it has the potential to have international consequences and become a source of conflict.

Environmental degradation caused by soil erosion, desertification, deforestation and inappropriate agricultural practices remains a major threat to agricultural sustainability. Abalu and Hassan estimate that 80 per cent of rangelands and rain fed croplands in southern Africa are degraded (Abalu and Hassan 1998). The forest cover is also rapidly declining. In the 1980s about 664,000 hectares of forest were cut down in southern Africa compared to a reforestation rate of about 92,000 hectares (Pinstrup-Andersen et al. 1997).

3.3.1.2 Sea Level Rise

Saltwater intrusion and coastal erosion, through sea level rise constitutes another threat. However, its effects will only be felt toward the end of the 21st century. Rising global temperatures will lead to an increase in sea levels, which implies greater exposure to flooding that damages infrastructure, roads and erosion from flooding. The costs of such events are not trivial. Collier and Goderis estimate that a typical shock such as flooding, reduces GDP by 0.4 per cent in a developing country (Collier and Goderis 2009).

3.3.1.3 Health Hazards

Some researchers argue that climate change/variability can lead to an expansion of those areas suitable for malaria transmission, and thus increase the risk of the disease. Others explain, that the malaria risk must be interpreted on the basis of local environmental and socioeconomic development, where land use decisions and the ineffectiveness (or absence) of malaria control programs may in fact be driving risk. Tanser et al. project scenarios that there will be an increase of 5-7 per cent in malaria distribution by 2100 (Tanser et al. 2003). The social and economic costs of malaria are huge and include considerable costs to individuals and households as well as high costs at community and national levels

(Holding and Snow 2001). Increasing temperatures will lead to a modest rise in the heat related mortality in Africa, but the impact through disease carrying insects will be substantial with the spread of Malaria and Dengue. Malaria has a substantial economic impact on Africa. It reduces the income by two-third's, and a 10 per cent reduction in malaria would lead to an increase in GDP of 0.3 per cent per annum (Gallup and Sachs 2001). HIV/AIDS is now bringing a new dimension to the food crisis, making populations even more vulnerable to climatic shocks (de Waal and Whiteside 2003).

3.4 Southern Africa and its Weak Political Structure

All states in the Zambezi Basin had been colonies of the European powers through much of the 19th and 20th century. By the beginning of the twentieth century, Britain, Germany and Portugal were the three colonial powers dividing the region among each other. Germany held the region of today's Namibia, Portugal controlled Mozambique and Angola, while Britain colonized South Africa, Zimbabwe, Botswana, Zambia and Malawi. Germany lost its rule over Namibia during the First World War when it became occupied by South Africa, whom lost it 1990; Angola gained independence in November 1975; Mozambique 1975; South Africa 1961 (end of white minority rule 1994); Malawi 1964; Zambia 1964; Zimbabwe 1965 (end of white minority rule 1980); Botswana 1966. Certainly there are marked differences in the trajectories of all the countries in southern Africa. Nonetheless, the parallels of their historical paths are overwhelming.

The examples of Angola and Mozambique stand out because of the sustained impact of their colonial struggle and post-colonial politics. The decades of liberation wars in both countries against the Portuguese rulers saw extreme violence that decisively shaped the political elites and societal beliefs. Once they obtained independence in 1975, Angola and Mozambique both suffered subsequent internal disruptions that led to lasting civil wars. Melber and Krampe argue:

The long anti-colonial struggle, fought also by non-violent, but mostly military means, had a lasting effect on the mindset of those ultimately seizing legitimate political power. The internal structures and social beliefs, especially among the elites, remained and, thus, paved the way for continued fighting for control (Krampe and Melber 2010)

3.4.1 Bad Leaders – Elites in Southern Africa

The liberation struggle in southern Africa made it difficult to overcome societal beliefs of the past and to overcome security dilemmas that are connected strongly to identity questions. This development has had severe consequences on the elites and political rule in the southern African countries. Since liberation from minority rule, the region of southern Africa has become dominated by two political forms of governance: Autocracy and Partocracy. This makes socio-political development of the region more complicated, and has negative effects on the democratic consolidation, as well as economic and social equality.

In particular the internal structures and procedures of parties that decide on leadership and political directions are crucial for the degree of popular legitimacy in dominant party systems, as they are the only elements that seem to allow debate and competition, and thus democratic space. Randell and Svasand argue that if the nomination process within the party is in the hands of the elites, as the case of the ANC in South Africa shows, it has a negative impact on opposition within the party (Randell and Svasand 2002). Additionally Lanegran concludes: 'Clearly, the lack of a competitive party system continues to make South Africa vulnerable to the pathologies of dominant party systems such as the stifling of policy alternatives and intolerance towards opposition opinions (Lanegran 2001: 99). While the electoral dominance of a party gives a high degree of efficiency to lawmaking, and approval by parliament is easy to attain, the repression of internal and external opposition must be seen as a decrease in their popular legitimacy, even though parties gained their dominance through the use of elections (Salih 2007).

Such partocratic structures can be found all over southern Africa, in Angola, Namibia, South Africa, Zimbabwe and Mozambique. The elite role on politics in southern Africa is significant and often decisions have a direct environmental and socio-economic impact on some groups in society. For instance along Lake Malawi, in Malawi, the authoritarian rule dispossessed fishers in the 1990s:

In the cases described, these communities, or community members within them, find themselves powerless to prevent the expropriation of the resources over which they previously had either legal or customary control. Thus, it is not the economic processes of dispossession alone which lead to human rights violations but rather dispossession combined with an authoritarian political context (Derman and Ferguson 1995).

In Zimbabwe Mugabe and the ruling party utilize natural resources for political purposes. The Zimbabwe-Bulawayo water transfer scheme aims to divert water from the Zambezi and help to supply Bulawayo (one

of the strongest economic cities of Zimbabwe) with water. Bulawayo was strongly affected by the drought in 1991/92. However, the matter of the pipeline appears to be a political tool to pacify the citizens in that region, because it is always brought up during election times, but still not implemented. The political dimension becomes more evident when considering that the former rival party, Zimbabwe's African People's Union (ZAPU), of Mugabe's ZANU, had its stronghold in Matabeleland of which Bulawayo is the capital. Following extensive use of force, ZAPU signed a peace accord with Mugabe's regime in 1988 which resulted in ZAPU merging with ZANU, forming the one dominant party in Zimbabwe ZANU-PF (Krampe 2010). Considering the resurrection of ZAPU in 2008, following the recent power sharing agreement between MDC and ZANU-PF, the political potential of the Matabeleland water situation (mostly dry) becomes evident. In addition, Matabeleland is ethnically Ndebele, while Mugabe and the water rich highlands are dominated by Shona.

3.4.2 Weak Institutions

Southern Africa seriously suffers from having weak institutions (Boege 2009). This makes for example water management more difficult. Kirchoff and Bulkley ascribe the interstate dimensions in the Zambezi basin as follows:

'Water management in the basin is especially difficult because there are multiple countries with multiple and competing interest; competing issues other than water that demand time, attention, and money; inadequate basin-level institutional structures; institutional, legal, economic, and human resource constraints within each country; and poor data collection, poor communication, and inadequate training' (Kirchhoff and Bulkley 2008: 1)

Mozambique has weak state institutions, corruption in the state system, and a lack of control and/or marginalization of the rural population. To overcome this problem the government's strategy of decentralization attempted to reach the rural population better. However, the situation with the two former civil war factions (FRELIMO and RENAMO) is dominating the government and opposition, tensions are often played out in politics (Söderberg Kovacs 2007). 'The relative lack of engagement with rural development following structural adjustment, and the struggles of the past that are still important in people's memories, have

undermined many attempts at building community cohesion in rural areas' (Osbahr et al. 2008: 1953).

Zimbabwe underwent an economic structural adjustment program (decontrolling of economy, reducing deficits and creating incentives for manufactures) under the assistance of the World Bank and IMF. As a consequence of the reduction of subsidies, food costs increased as transport costs and agricultural production costs increased. The unemployment rate increased as well (Mukamuri et al. 2003: 29). Mukamuri, Campbell and Kowero argue that the reforms 'eroded the efficiency of public organizations by constraining the availability of financial and other resources to them. These organizations have scaled down their operations and/or devised coping measures which compromise natural resource management' (Mukamuri et al. 2003: 41). Conflict with the IMF and the dispossession of farmland from White farmers in 1999 increased food insecurity and economic instability, contributing to the further weakening of already weak state institutions.

3.4.3 Polarized Social Identities – Longtime Struggles and Protracted Identities

Daniel Bar-Tal argues that at the end of protracted violent conflicts it is the 'societal beliefs' – the shared beliefs of the group, and of 'the other', the enemy – that need to change in a process of reconciliation (Bar-Tal 1998, 2000). In Angola and Mozambique, as in many post-colonial states, the long anti-colonial struggle has had a lasting effect on the mindsets of the elites. These elites have persisted and strengthened their conflictive beliefs during violent civil wars and still retain their viewpoints, even years after fighting has ended. This development is similar also in Zimbabwe and to a limited degree in Namibia and South Africa.

In Zimbabwe the role of conflictive beliefs dominates politics until today. Mugabe's policy to equalize Zimbabwe with his ZANU movement was not well received by the former liberation struggle ally ZAPU and interpreted as an impelled subordination under ZANU. This is indicated through different dynamics affecting ZAPU during the period of independence. In the early 1980s power sharing between ZANU and ZAPU combined with their remaining distrust for one another created an assortment of problems. A prevailing feeling among ZAPU supporters was that the government (controlled mainly by ZANU) was not working in the interest of the people in the eastern provinces (ZAPU 1981a, 1981b). When ZAPU icon Nkomo lost his cabinet post in January 1981,

and became minister without a portfolio, he realized that he could not win against Mugabe and accepted to play a subordinate role (Lewis 9 March 1981). However, the whole ZAPU movement did not share this attitude. As a result people in Matabeleland felt even more misrepresented by the government (Krieger 1995). The situation eventually accelerated into a massive conflict in 1983 that would last until the end of the decade. The Unity Accord of 1988 between ZAPU and ZANU, united the majority of people 'on paper' under a Zimbabwean national identity. But in reality ZAPU, after suffering a continuous war of attrition with ZANU, had to surrender. Conflictive attitudes and resentments remain as a result of this war. The continuous dispute about the historical narrative of the country shows that all groups in Zimbabwe maintain their particular identity (Krieger 1995: 142; Ranger 2004).

To date, in Angola, Mozambique, Zimbabwe, Namibia and South Africa the former liberation movements remain in firm control of domestic politics and the economy. The ruling movements continue to carry on their beliefs from their previous periods of conflict. Maintaining these beliefs allows them to justify their own use of violence and atrocities, maintain their identity and constituency, and marginalize the opposition (Lundwall 2001).

As political parties these movements consolidated their rule by means of clientelist regimes. Examples of this have been particularly visible in Zimbabwean politics over the last decade. This is not a strong foundation for lasting peace and stability, but rather represents the impact of decades of intractable conflict on the political elites.

The opposition groups (RENAMO, UNITA, ZAPU) have lost their influence and seem to have gradually become irrelevant to their respective countries political future. Nevertheless, the culture of impunity in southern Africa enables conflictive attitudes to persist among the elite. With all the former belligerents maintaining a mindset of confrontation, the situation in both states bears a latent potential for renewed conflict.

4

Zimbabwe and Mozambique: Focus Areas

4.1 Vulnerability of Zimbabwe and Mozambique to Climate Change/Variability

The region as a whole is susceptible to various types of changes induced by climate. Table 6 provides a summary of the climatic challenges faced by the countries in southern Africa. While lack of precipitation and the drought situation is critical for Zimbabwe, Mozambique is particularly threatened by seawater rise and salt-water intrusion. Both countries face vulnerability to the loss of biodiversity, tourism, health, infrastructure, fisheries, agricultural, and food security and livestock. Together, both Zimbabwe and Mozambique provide the opportunity to study a wide range of climate change/variability effects and its impact on an array of vulnerable sectors. Both countries are emerging from a conflict situation with the majority of the population dependent of climate-sensitive resources. Poor access to water and infrastructure, and a health status defined by the prominent presence of HIV/AIDS, will enable us to analytically assess the various interactive effects and dynamic processes of climate induced impacts and how they may perpetuate a conflict situation in their respective societies.

Table 7 presents some of the basic indicators of the economy and the agricultural sector. In Mozambique (Zimbabwe) about 62 per cent (40 per cent) of the land is engaged in agriculture. Agriculture remains an important contributor to GDP. About 31 per cent of Mozambique's GDP is contributed from the agricultural sector, whereas the figure for Zimbabwe is slightly lower at 19 per cent. A substantial percentage of the population in both countries works in the agricultural sector. Figure 6 shows the fluctuations in the cereal production index, with a sharp decline in production during drought years.

Table 6: Climatic challenges, vulnerable sectors and vulnerability context in South Africa

		Angola	Botswana	Lesothos	Malawi	Mozambique	Namibia	South Africa	Zambia	Zimbabwe
Climatic Challenges	Increase of temperature									
	Increased incidence of droughts									
	Decrease in rainfall									
	Seasonal shifts in rainfall									
	Heavy snowfalls and winds									
	Cyclones									
	Localized floods									
	Overflowing of large rivers									
	Decreased /varying river flow									
	Wildfires									
	Sea level rise									
	Salt water intrusion									
	Coral reef bleaching									
	Land slides in mountainous areas									
Vulnerable Sectors	Water scarcity									
	Biodiversity loss/tourism									
	Health/disease outbreaks									
	Hydropower									
	Coastal eco sys, islands & cities									
	Infrastructure									
	Fisheries									
	Agriculture and food security									
	Livestock									
Vulnerable Context	Urbanization									
	Spread of cash crops									
	Conflict/post-conflict/insecurity									
	Inequitable land distribution									
	Low education									
	Poor infrastructure									
	Gender inequality									
	Dependence on climate-sensitive resources									
	Poor water access by population									
	Poor health status									
	HIV AIDS									

Source: Extracted from Eriksen et al. (2008). Note: Based in an assessment of available information which varies in quality between countries; there may also be large geographical variations in the variables within countries.

Table 7: Basic Indicators for southern African countries

	Pop	Annual real GDP growth	GDP (in PPP)	Agri value added (as % of GDP)†
	('000)	(av. 2001-09)	(US \$ Million)	(in 2009)
Angola	18 498	11.6	100 459	10
Botswana**	1 950	3.9	25 764	3
Lesotho*	2 067	3.1	2 482	8
Malawi*	15 263	4.9	8 395	36
Mozambique	22 894	8.0	21 746	31
Namibia**	2 171	4.3	13 737	9
South Africa**	50 110	3.6	487 107	3
Zambia	12 935	5.4	19 606	21
Zimbabwe	12 523	-5.4	2 193	19
Africa	1008 354	5.3	2 825 691	

Note: * Fiscal year July (n-1)/June (n) ** Fiscal year April (n)/ March (n+1). Sources: United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects, The 2008 Revision. ADB Statistics Department, Various domestic authorities and IMF World Economic Outlook (March 2010). †World Bank national accounts data, and OECD National Accounts data files. Figure for Zimbabwe is from 2005.

Crop production index shows agricultural production for each year relative to the base period 1999-2001. It includes all crops except fodder crops. Regional and income group aggregates for the FAO's production indexes are calculated from the underlying values in international dollars, normalized to the base period 1999-2001.

So who are vulnerable to climate change/variability? Marginalized sections of the population that are constrained or unable to cope with the risk, adapt to it and diversify their livelihoods, are the most susceptible. These may also include those who lack access to forests or productive land, and those who have been displaced from their homes due to floods, conflicts, or livelihood shocks without receiving adequate humanitarian assistance. The vulnerable often live in areas that are characterized by lack of basic services, leading to health problems, difficulty to accessing water, and crop and livestock disease. They are also often exposed to a lack of security. Households that are affected by HIV/AIDS, malaria, and other infectious diseases are also more vulnerable to climatic events, as they are exposed to labor shortages during critical periods or a breakup of the family.

Vulnerability however may vary within regions and between individuals. Comparing climate vulnerability in two villages in Zimbabwe, Eriksen et al. argue that village level vulnerability varies depending

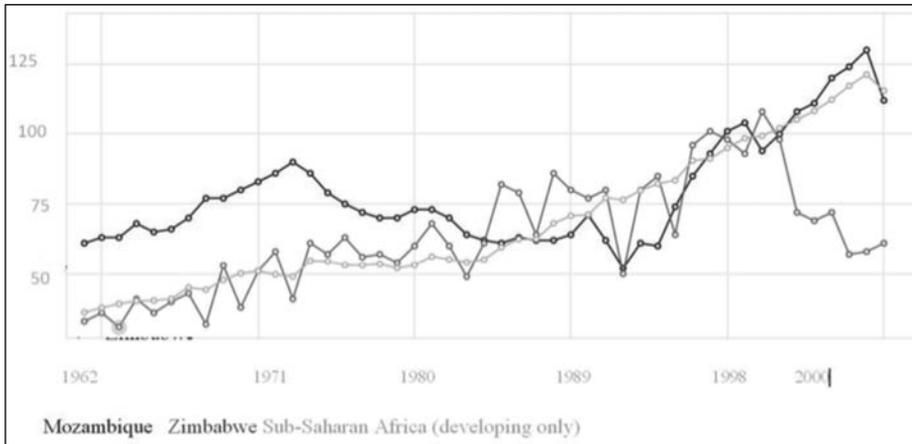


Figure 6: Crop Production Index (1999-2001=100) for Mozambique, Zimbabwe and Sub-Saharan Africa. Source: Food and Agriculture Organization, electronic files and web site. Crop production index shows agricultural production for each year relative to the base period 1999-2001. It includes all crops except fodder crops. Regional and income group aggregates for the FAO's production indexes are calculated from the underlying values in international dollars, normalized to the base period 1999-2001.

on their access to markets, power structures and the breakdown of social networks. Factors such as poor infrastructure, lack of markets, limited institutional support, and a poor and deteriorating biophysical environment increased its vulnerability further. Similarly, in southern Mozambique, during the 2001-2003 drought, some commercial farmers were able to pump ground water to irrigate their crops and thereby profited from higher prices. Smallholder farmers, on the other hand, lacked the resources to do this and coped with the situation through casual employment at low wages, collecting forest food or cultivating crops, such as pumpkins and sweet potato leaves in riverbeds (Eriksen et al. 2008).

4.2 Zimbabwe

4.2.1 Climate Change/Variability in Zimbabwe

UNEP reports in reference to the Zimbabwe Department of Meteorological Service that the national rainfall deviation is deviating from the mean more frequently. According to the same statistics, between the middle of the 1980s until 2000, rainfall was constantly below the mean (this is the longest deviation below the mean since 1910) (UNEP/GRIDA 2002). In Zimbabwe several perennial streams dried out dur-

Table 8: Basic Indicators for southern African countries

	Pop	Agri land	Annual real GDP growth	GDP (in PPP)	Agri value added (as % of GDP)†
	('000)	(as % of land area) in 2007	(av. 2001-09)	(US \$ Million)	(in 2009)
Angola	18 498	46.2	11.6	100 459	10
Botswana**	1 950	45.6	3.9	25 764	3
Lesotho*	2 067	75.9	3.1	2 482	8
Malawi*	15 263	52.8	4.9	8 395	36
Mozambique	22 894	62.1	8.0	21 746	31
Namibia**	2 171	47.1	4.3	13 737	9
South Africa**	50 110	81.8	3.6	487 107	3
Zambia	12 935	34.4	5.4	19 606	21
Zimbabwe	12 523	39.9	-5.4	2 193	19
Africa	1008 354		5.3	2 825 691	

Note: * Fiscal year July (n-1)/June (n) ** Fiscal year April (n)/ March (n+1). Sources: United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects, The 2008 Revision. ADB Statistics Department, Various domestic authorities and IMF World Economic Outlook (March 2010). †World Bank national accounts data, and OECD National Accounts data files. Figure for Zimbabwe is from 2005.

ing the 1991/1992 drought. According to Madadza, the configuration of the irrigation systems in Zimbabwe is very vulnerable to evaporation, thus a reduction of their efficiency is expected with a rise in temperature (Magadza 1994: 170). In general the Zimbabwean wetlands will be strongly affected by evaporation. Analysis of reservoirs in northeast Zimbabwe indicates a 49 per cent reduction of surface area between the wet and dry season, while many smaller reservoirs will completely dry out. Through climate change/variability a further reduction is likely that will affect agriculture production. Moreover, the dams supplying cities (Gaborone, Botswana, and Bulawayo, Zimbabwe) failed to supply them with water during the 1991/1992 drought (Magadza 1994: 171).

According to the Zimbabwe Department of Meteorological Services, Zimbabwe has experienced an increasing number of hot days between 1950 and 1990 (UNEP/GRIDA 2002). A 1994 study on the social vulnerability to climate change/variability in Zimbabwe finds that particular rural populations in Zimbabwe are vulnerable to changing climate. By 1994 almost 10 per cent of the population in Zimbabwe faced food-insecurity, even though agricultural production remained at average levels. An increase of temperature by 2°C would cause a decrease of

Zimbabwean wetlands from 9 per cent to 2.5 per cent, and a 4°C increase would reduce ‘the summer water-surplus zones to less than 2%’ (Bohle et al. 1994: 47). This change in temperature is claimed to sharply affect agricultural production and particular crop yields. Magadza projects that a 4 °C temperature rise in Zimbabwe will decrease the maize yield by 20 per cent in the north-east, and 27 per cent in the south-east region that borders Mozambique (Magadza 1994: 175 and 77).

4.2.2 Economic Impact of Climate Change/Variability in Zimbabwe

Zimbabwe’s economy is dominated by agriculture and the smallholder farming sector. Agriculture provides employment and livelihoods for about 70 per cent of the population, and accounts for 40 to 50 per cent of the country’s total export revenues. Zimbabwe is amongst the worst affected by droughts and is also a signatory to the United Nations Convention on Climate and Desertification. It is facing the adverse effects of climate, which negatively impacts growth in the agricultural sector, and perpetuates subsequent degradation of the environment, as rural households try to meet their livelihood needs (Twomlow et al. 2008). According to Zimbabwe’s Initial National Communications under the United Nations Framework Convention on Climate Change, likely impacts in Zimbabwe caused by present trends in climate change include increased water demand for irrigation due to increased evapotranspiration, a decrease by approximately 30–40 per cent in water yield per dam, worsening water supply/demand for both industrial and agricultural purposes and the reduced generation of electricity at the Kariba hydropower station. Changes in net revenue are very high for dryland farming compared to farms with irrigation, indicating that irrigation is an important adaptation strategy that will help to reduce the impact of further changes in climate.

Zimbabwe’s agricultural sector contributes about 17 per cent to the country’s GDP (CEEPA 2006). Investigating the disaggregated data at the provincial level (table 9), we find that in Midlands, Matabeleland North and South, the population has much greater access to land, as compared to the rest of the country. The size of the land holdings however, is much smaller than those in Mashonaland Central and Mashonaland East. We do not want to infer too much from these figures as ‘adequacy of land distribution’ has not been explained clearly and a look at the average landholdings size at the provincial level across poor and non-poor categories looks very unreliable. There is no note that clearly ex-

Table 9: Zimbabwe's Provincial level data for access to land for cultivation, size of landholding, adequacy of land distribution and food poverty

Provinces	Population In 2004	Access to land for cultivation	Average land holding (in sq ha)	Percentage of people below food poverty line	Adequacy of land distribution		
					Adequate	not adequate	not stated
Manicaland	1 468 196	82	2.65	58	37	62	1
Mashonaland Central	898 271	83	8.15	46	18.5	81.5	0
Mashonaland East	980 591	82	7.02	54	43.8	50	6.3
Mashonaland West	1 211 863	66	3.79	46	33.3	56.7	10
Masvingo	1 192 550	90	3.06	63	36.4	63.6	0
Matabeleland North	649 431	93	3.79	64	63.6	33.3	3
Matabeleland South	591 989	92	3.32	58	66.7	28.6	4.8
Midlands	1 320 706	94	5.08	64	42.1	47.4	10.5
Bulawayo	568 157	-	-	49	-	-	-
Harare	1 933 864	-	-	30	-	-	-

Source: MPSSL & SW_PASS_2003, CSO_IM-LFS_2004 as accessed from ZIMDATA, 2009.

plains what 'adequacy of land distribution' means. However, it is clear from the reported data that a substantially higher percentage of people in Matabeleland (North and South) seem to state that the land distribution is adequate, as compared to the population in the rest of the country. Matabeleland North, however remains one of the poorest provinces with 64 per cent of the people below the food poverty line.

Zimbabwe is amongst the worst affected by droughts. It is facing the adverse effects of climate, which negatively impacts the growth in the agricultural sector, and perpetuates subsequent degradation of the environment, as rural households try to meet their livelihood needs (Twomlow et al. 2008). Crops in Africa are grown close to their thermal tolerance limit. Crop yields for wheat, fruit trees, groundnut, and soybean can be reduced by a few days of high temperatures near flowering (Challinor et al. 2006). Longer periods with high temperatures will force marginal agriculture out of production, a situation that is already experienced in southern Africa. In Zimbabwe and South Africa

maize production is already effected (Collier et al. 2008a).⁹ This has important implications for food security since maize is the staple food of the population and has an impact on the agriculture-based manufacturing industries.

Table 10 compares the situation of farmland under maize cultivation and total maize production between 2001 and 2009. The maize production in Zimbabwe is concentrated in Central, East and West Mashonaland. North and South Matebeleland account for about 10 per cent of the total maize production in Zimbabwe. If Zimbabwe's Department of Agricultural Technical and Extension services (AGRITEX) figures are treated as reliable, the percentage change in the area under maize production has reduced by 10 per cent in North Matebeleland and almost doubled (174 per cent) in South Matebeleland, between 2001 and 2009. These figures are however disputed by the USDA (USDA 2009). Based on satellite imagery data, they assert that the area under maize cultivation has seen a decline in most provinces of Zimbabwe during the period of 2000 to 2009, except for Mashonaland East province. The sharpest decline in the maize area under production is in the North and South Matabeleland provinces (see table 10). North (South) Matabeleland has seen a decline of about -87 per cent (-93 per cent) between 2000 and 2009.

Given the lack of reliable data, satellite data has also been used to investigate the change in the land area for maize cultivation across different farm categories between 2000 and 2009 (USDA 2009). The maize area under cultivation did not increase for any farm class (see table 11). The sharpest decline in terms of area under maize production has shown a sharp decline for communal land (-34 per cent), large scale commercial farms (-37 per cent) and small scale commercial farms (-36 per cent). It is the same story for other land categories as well. Overall, Zimbabwe's maize farming area has experienced a decline of about 30 per cent. USDA suggests that this is due to the poor seed quality and very low seed production (USDA 2009). And unless the problem with shortage of all inputs such as seeds, fertilizers, lime, pesticides, diesel etc. is addressed, Zimbabwe will continue to face a chronic food insecurity problem.

Mano and Nhemachena examine some simple climate scenarios to see how agricultural production in the country would respond to climate change. These showed that a 2.5°C increase in temperature would

⁹ These adverse effects need to be combined with the positive impact of 'carbon fertilization effect' on plant growth caused by elevated levels of carbon dioxide. However, recent research shows that these benefits are significantly less than initially thought and have limited effect on non responsive species like maize and sorghum.

Table 10: Percent Change in Area of Maize Production in Zimbabwe's Provinces

Data Source	2001			2009		
	CFSAM /AGRITEX			AGRITEX		
Provinces	Area (ha)	Prod (tonnes)	% Production	Area (ha)	Prod (tonnes)	% Production
Manicaland	158 629	176 919	12	216 585	168 936	14
Mashonaland Central	140 175	247 981	17	180 094	174 691	14
Mashonaland East	220 136	293 628	20	241 768	186 161	15
Mashonaland West	198 919	475 210	32	195 679	246 556	20
Midlands	209 348	83 680	6	301 765	202 183	16
Masvingo	170 270	114 244	8	207 459	141 072	11
Matabeleland North	90 076	65 052	4	80 971	51 821	4
Matabeleland South	35 513	10 034	1	97 459	71 145	6
Harare	No data	No data		No data	No data	
National Total	1 223 066	1 466 748	100	1 521 780	1 242 565	100

Table 10 (continued)

Data Source	AGRITEX	Landsat-7 /AWiFS Per cent area
Provinces	Per cent area	change09/01
Provinces	Change 09/01	
Manicaland	37	-8
Mashonaland Central	28	-9
Mashonaland East	10	1
Mashonaland West	-2	-28
Midlands	44	-59
Masvingo	22	-69
Matabeleland North	-10	-87
Matabeleland South	174	-93
Harare		10

Source: FAO Crop and Food Supply Assessment Missions (CFSAM), Zimbabwe's Department of Agricultural Technical and Extension services (AGRITEX) and the Landsat-7 and AWiFS data and images as processed and extracted by GDA crop (as accessed from USDA 2009).

Table 11: Farm Class Percent Change in Area from 2000-2009 in Zimbabwe (Satellite Estimates)

Farm class	2000 – 2009 Per cent Area Change (%)
A1	-26
A2	-19
Communal Lands	-34
Large Scale Commercial	-37
Old Resettlement Areas	-16
Small Scale Commercial	-36
Total	-30

Source: Landsat-7 and AWiFS data and images as processed and extracted by GDA corp (as accessed from USDA 2009).

result in a decrease in net farm revenues by US\$0.4 billion for all farms and increase net revenue for farms with irrigation by US\$0.3 billion. If there is a 5°C rise in temperature, it would result in a decrease in net revenues across all farms, dryland farms and farms with irrigation by US\$0.4 billion, US\$0.5 billion and US\$0.003 billion, respectively. The impact of a decrease in rainfall is no better. A 7 per cent and a 14 per cent decrease in precipitation would result in a decrease in net farm revenue by US\$0.3 billion for all farms (Mano and Nhemachena 2007).

Drought continues to be one of the toughest problems facing Zimbabwe. Recent projections of precipitation and runoff in Africa suggest a drop of up to 10 per cent in precipitation in most of southern Africa (including Zimbabwe) by 2050. This will have serious implications. About 80 per cent of Zimbabwe’s 12.5 million inhabitants are farmers, with 30 per cent of the urban population engaged in the agro-industry. The economic damage and human suffering associated with droughts would therefore be enormous. Also, 80 per cent of Zimbabwe’s electricity supply comes from the Lake Kariba dam, thus making the electricity supply vulnerable to changes in the water/rain supply (Levina 2006: 66-69).

Climate change/variability is also impacting the health situation, especially malaria and nutrition, and Zimbabwe is facing reduced biodiversity and inflow of tourists. Using a range of future climate scenarios, Ebi et al. find that climate suitability for malaria transmission in Zimbabwe is also likely to increase in the high population density areas of the central plateau. Zimbabwe could have near-complete climate suitability for stable malaria transmission by 2050. The highlands are also expected to become more suitable for transmission of malaria. Non-climatic fac-

tors like parasite drug resistance, demographic change, changes in land-use patterns, the success of disease intervention programs (Roll Back Malaria and the Multilateral Initiative on Malaria), civil unrest, deterioration of public health systems, and HIV proliferation will also dictate how serious the malaria problem becomes (Ebi et al. 2005).

4.2.3 Political Situation in Zimbabwe

4.2.3.1 Bad Leaders in Zimbabwe and Bulawayo – Matabeleland North

One of the reasons why climate change/variability-induced violence is especially likely to break out in Zimbabwe in general, and Bulawayo/Matabeleland-North in particular, is the presence of bad leaders. This argument is based on two observations. First, many elites and actors have historically had a detrimental effect on the area, not hesitating to manipulate politics and incite violence for their own purposes. Having been bad leaders in the past – and faced with the prospect of resource scarcity caused by climate change/variability– there is a high likelihood that they will incite new violence. Second, the political situation in Zimbabwe and Bulawayo/Matabeleland-North is tense. If there is climate change/variability– leading to increasing food and water insecurity – there is a danger that elites, even those that have previously not been bad leaders, may sponsor violence. Based on historical and present dynamics, there are two categories of elites that may become bad leaders in the future: those affiliated with ZANU-PF and those allied with the opposition.

ZANU-PF Elites

In Zimbabwe elites close to, or part of, the ZANU-PF ruling regime, have had a detrimental effect on security and development since the country's independence in 1980. Not only have they sponsored organized violence and extrajudicial killings, they have also engaged in systematic abuses against the opposition and other civilians. Much of the state sponsored violence in Zimbabwe has been concentrated to the Bulawayo/Matabeleland-North area. The primary reason for this is that support for political parties opposed to the ZANU-PF regime has historically been strong in Bulawayo and Matabeleland. Seeking to contain the threat posed by opposition groups, it has therefore been natural for the Mugabe regime to concentrate its campaigns of violence towards Bulawayo/Matabeleland-North. There are particularly four types

of ‘bad leaders’ that have been responsible for these actions, and may thus instigate climate change/variability-induced conflicts in the future: leaders of the Zimbabwe Liberation War Veterans Association (ZNLWVA), elites within ZANU’s Youth Brigades, generals and officers in the armed forces and police corps, as well as ZANU-PF dignitaries.

Since the late 1990s the war veterans of ZNLWVA have been a political force to reckon with. Under the charismatic leadership of Chenjerai Hunzvi, ZNLWVA – after having negotiated economic benefits for its members – agreed to become a de-facto government militia that could be used against the opposition. Seeking to punish white farmers and black farm workers – both suspected to have voted against a ZANU-PF sponsored referendum on constitutional reforms in February 2000 and sympathize with the newly formed opposition party Movement for Democratic Change (MDC) – the regime supported large-scale farm invasions by armed groups of war veterans during the spring of 2000. The invasions, whose purpose was ostensibly to give blacks and war veterans access to farmable land largely owned by white owners, resulted in dozens of deaths, systematic torture, beatings, destruction of property, displacement of large numbers of people and the loss of at least 300,000 jobs (ICG 2001b: 3-10; Kriger 2003).¹⁰ Although the war veterans were primarily active during the farm invasions, they have also engaged in different types of violence against the opposition. During 2001-02, for instance, war veterans wrecked havoc in Bulawayo on several occasions: rioting, and attacking newspaper and MDC offices.¹¹

Based on historical events, elites controlling different youth militias also have the potential to become bad leaders in the near future. During the 2000’s such militias came to play an increasingly central role in the violence committed against the Zimbabwean opposition, functioning as auxiliaries to the war veterans and the security forces. It was with the holding of the 2002 presidential elections that ZANU’s Youth Brigades gained prominence, a position they continue to hold. Recruited and placed in National Youth Training Centers, young men and women were

¹⁰ During the farm invasions it was, however, not only ex-combatants from the liberation struggle that participated. To bolster their numbers, ZNLWVA had previously accepted large numbers of unemployed youths and ZANU-PF supporters into their ranks. It is reported that much of the violence was, in fact, carried out by the two latter categories of individuals (ICG, ‘Zimbabwe in Crisis: Finding a Way Forward’, (International Crisis Group, 2001b): 3-10..

¹¹ BBC News: War Vets Wreak Havoc in Bulawayo, 14 February 2002. Available at <http://cdnedge.bbc.co.uk/1/hi/world/africa/1820330.stm>. (Last visited 30 March 2011) and ICG, ‘Zimbabwe: Time for International Action’, (International Crisis Group, 2001a) at: 9, Alex Duval Smith, ‘Zimbabwe Police on Alert after Rioting in Bulawayo’, *The Independent*, 18 November 2001.

taught to hate MDC and how to suppress and torture its sympathizers (ICG 2002e: 3; 2010: 6). Youth Brigade units have committed extrajudicial violence in large parts of the country, ranging from political murder and rape, to attacks on and the illegal detention of suspected MDC supporters (Africa Confidential 2008; ICG 2008c: 6). This violence has often been centered in Bulawayo/Matabeleland-North. For example, during the 2002 presidential elections, youth militias were deployed in the rural areas of Matabeleland to intimidate voters from casting their votes (Africa Confidential 2002: 4; ICG 2002c: 8).

Although much of the political violence in Zimbabwe can be traced back to non-state security actors, such as ZNLWVA and ZANU's Youth Brigades, there are – based on atrocities committed in the past – reasons to suspect that senior army generals and police officers may also sponsor violence in the future. There is, for example, abundant evidence indicating that it was approximately 200 senior military officers that were in charge of leading youth militia retaliation against MDC members and supporters after the 2008 elections (Africa Confidential 2008). By indirectly utilizing aggrieved war veterans and marginalized youths, the political and military leadership was able to divert some of the negative attention away from themselves. Despite this, security forces have at times engaged themselves directly in different forms of political violence. In the aftermath of the 2008 elections, the security forces were for example, mobilized to harass rural areas with strong MDC backing (ICG 2008c: 1, 6).

Even if generals, officers and militia leaders have at times had autonomy when it comes to the planning and execution of campaigns of violence, it would be an exaggeration to claim that they constitute the most perilous bad leaders for the future. Consider that since 1980, no major political or military decisions have been taken without the direct initiation or clearance by President Mugabe and ZANU-PF's top brass. Mugabe, for example, has systematically sought to centralize power for himself ever since becoming president; in particular, control over the security forces (Africa Confidential 2008; ICG 2007: March 2007: 7). Control of the later has continued despite the power-sharing arrangement that ZANU-PF entered with MDC-Tsvangirai (MDC-T) and MDC-Mutambara (MDC-M) in 2009 (Africa Confidential 2009). This concentration of power, means that Mugabe is ultimately responsible for much of the violence that Zimbabwe has suffered during the last three decades. Nowhere is this clearer than in the Gukurahundi or "Matabeleland Massacres". In the mid-1980s, Mugabe ordered the armed forces to quell unrest in Matabeleland North and South, after

members of the Zimbabwe African People's Union (ZAPU) – a rival guerilla group during the liberation struggle – began protesting over Mugabe's arrest of the ZAPU leader Joshua Nkomo, and his plans to create a one-party state. Upon entering the area the army unleashed a series of massacres, beatings and tortures, resulting in the death of an estimated 15-20,000 civilians (ICG 2001b). To organize different acts of violence, Mugabe has also had the help of several of ZANU-PF's central figures, the most infamous being Emmerson Mnangagwa. Not only was Mnangagwa, as Minister of State Security, heavily implicated in the Matabeleland Massacres, he was also the main architect behind the armed offensive against MDC activists and supporters after the 2008 national elections, which resulted in the killing of 100 opposition supporters (Africa Confidential 2003, 2008).

The historical record track record of ZANU-PF politicians and affiliated elites thus gives an indication of their potential to act as bad leaders in the future. The question is, however, why we should expect climate change/variability to increase the risk of them doing so? There are two potential answers to this question: climate change/variability may, first, generate violent elite competition over increasingly scarce resources, and national and local leaders may, second, manipulate their constituencies' fear of resource scarcity for their own political purposes – which in itself may not have anything to do with climate change/variability). When speaking about the first scenario, it is necessary to understand the crucial role that networks of patronage play for ZANU-PF. By confiscating farmlands (intended for war veterans or landless laborers), manipulating exchange rates, controlling mining assets, and creating artificial shortages on basic commodities, many ZANU-PF leaders and generals have amassed vast riches. Besides satisfying the economic needs of the party's dignitaries and allies, such assets have allowed ZANU-PF to sustain popular support amongst its traditional followers (Africa Confidential 2003; ICG 2006b: 4-5; 2009: 4, 13). This is especially true concerning access to food; through government monopolies ZANU-PF has been able to distort deliveries of grain and maize from opposition to ZANU-PF areas (ICG 2002a: 7). Hence, if climate change/variability results in a sharp drop in agricultural output and water scarcity, different ZANU-PF elites will have incentives to protect their economic interests by sponsoring political violence. Such acts will either target MDC-M and T – if the two use their position within the power-sharing government to root out the corrupt policies and practices within state administration; or degenerate into inter-ZANU-PF violence as different factions scramble to control the few resources still available. The lat-

ter scenario may be particularly plausible, when considering that there were reports already in 2003 of growing tensions between war veterans, youth militias and members of the security forces due to competition over 'control of local food distribution networks, newly expropriated farms, and other elements of the overextended patronage system' (ICG 2003a: 1).

Even if climate change/variability would not directly affect ZANU-PF elites, they could, for political reasons of their own, play on their constituency's fears of food and water insecurity. This could, for example, be the case if there is an escalation in demands from the opposition to make Mugabe, and other central ZANU-PF figures, accountable for the atrocities they have committed. Such calls have been especially strong from Bulawayo/Matabeleland-North, where many victims of the 1980's massacres want to see top military and political figures, such as Mnangagwa, placed on trial (Africa Confidential 2008; ICG 2003a: 14). Considering that ZANU-PF elites have systematically employed violence when threatened in the past, it is possible that they could galvanize their followers to attack members of the opposition by promising them access to productive lands and water resources. This is a probable scenario when considering ZANU-PF's past manipulation of the land issue.

Irrespective of the immediate reasons for ZANU-PF elites to sponsor climate change/variability-related violence, such acts are likely to be predominantly localized in Bulawayo/Matabeleland-North. Not only is the region already suffering from periodic shortages of food and water, it also constitutes one of the main opposition strongholds. It would therefore be rational for the Mugabe regime to concentrate spoiling behavior to these predominantly Ndebele areas.

Opposition Elites

Even if most collective violence in Zimbabwe has been instigated and planned by ZANU-PF affiliated leaders, there are reasons to suspect that other elites – based on past records and future scenarios – could become bad leaders. Since its creation in 1999, MDC has been the main opposition force in the country. Although it has successfully gathered support from large segments of Zimbabwean society, and has a substantial following in most provinces, it has not succeeded in creating a unified political organization with a strong ideological base. In fact, it has more resembled a conglomerate of different actors (trade unions, civil society groups, intellectuals, youth leaders, white farmers and even some war veterans) foremost united by their opposition to Mugabe (Africa Con-

fidential 1999, 2003; ICG 2001b: 3, 13). The difficulties of uniting this motley collection of social forces and interests, have at times, created serious rifts within the party. These divisions have largely emerged out of disagreement over the most appropriate strategy for dealing with the ZANU-PF's oppressive tactics. While the President of the party – Morgan Tsvangirai – has often advocated a more confrontational approach, including mass protests and electoral boycotts – party leaders such as Welshman Ncube and Arthur Mutambara have called for less militant tactics and more electoral participation. The rifts over political strategy have been reinforced by ethnic and class differences, with the Tsvangirai faction mainly drawing support from trade unionists and members of the Shona community, where as his opponents draw from the intellectuals and Ndebeles (Africa Confidential 2003: 4; ICG 2005b: 10). By 2006 the MDC-split became formal, as Ncube and Mutambara refused to adhere to Tsvangirai's calls to boycott the 2005 senatorial elections. As a consequence the two former founded a new party, MDC-M, to contest the elections. Even if MDC-M has sought to become a national party, it has been rather unsuccessful in mobilizing support outside Bulawayo and Matabeleland-North and South, in essence making it an Ndebele party (ICG 2006a: 6; 2007: 8-9).

Due to its internal problems and the systematic abuses committed by the ZANU-PF regime, MDC militants have, on occasion, employed violence. This has oftentimes been centered in Bulawayo/Matabeleland-North. For example, after ZANU-PF militants burned down MDC's regional office in Bulawayo in November 2001, supporters of the opposition party retaliated by attacking the ZANU-PF headquarters (Africa Confidential 2001; Smith 2001). Meanwhile, between 2005 and 2006 MDC-M and –T supporters regularly clashed in Bulawayo/Matabeleland-North during street fights and political rallies (ICG 2006b: 8-9; 2006a: 6).

There is, furthermore, the future risk that former cadres of the ZAPU sponsor different forms of violence; either to strengthen their position during power struggles with other Ndebele elites, or in retaliation for ZANU-PF abuses. After the Matabeleland Massacres, and the crushing of ZAPU resistance in Matabeleland, Nkomo and his ZAPU agreed to enter a political alliance with ZANU in 1987, forming the ZANU-PF.¹² Even though it was agreed that one of the two Vice Presidencies would always be allocated to a ZAPU dignitary, the deal de facto ensured ZANU dominance over ZANU-PF, the state apparatus and security

12 Before 1987 Mugabe's rebel group was known only as ZANU.

forces. Even if Nkomo endorsed the 1987 agreement, and became Vice President, there have since then been some opposition within ZAPU ranks over the political merger. This has, from time to time, resulted in ZAPU veterans forming new political parties, such as Liberal Party of Zimbabwe and ZAPU 2000. These parties have sought to capitalize on Ndebeles feelings of political and social marginalization, and harm over the Matabeleland massacres (Africa Confidential 1999). The most serious challenge to the ZANU-ZAPU alliance is when Dumiso Dabengwa – one of the most senior ex-ZAPU and ZANU-PF leaders – announced its dissolution and officially relaunched ZAPU as an independent party in October 2008 (ICG 2010: 11).

Even if some ZAPU leaders have distanced themselves from the ruling party, other senior members have chosen to remain in ZANU-PF. This includes figures such as Joseph Msika and John Nkomo (no relation to Joshua Nkomo). Despite the small size of the Ndebele constituency, 14 per cent of the population, it has historically been important for members of the regime to seek support from ex-ZAPU leaders within ZANU-PF; both to check the advance of MDC (with its strong Ndebele following) and to gain valuable allies during intra-ZANU-PF disputes. This dependence has allowed some former ZAPU leaders to build a strong political platform for themselves within ZANU-PF.

Former ZAPU leaders have also shown that they are not averse to inciting and using violence. During the Matabeleland Massacres, for instance, many ZAPU combatants and supporters did take to arms against the army in Matabeleland. Ex-ZAPU members have, furthermore, been associated with armed acts committed after the 1987 peace accord. Evidence suggests that at a ZANU-PF rally in Bulawayo in November 2001, Dabengwa incited party militants to use violence, ultimately leading to attacks against MDC property and firefighters (Africa Confidential 2001). Meanwhile, in May 2006 there were reports of fighting between different groupings of war veterans in Bulawayo, apparently caused by a power-struggle between John Nkomo and Dabengwa over who should become the new Vice President of ZANU-PF (Africa Confidential 2006).¹³

Hence, even if it is difficult to categorize MDC and ZAPU-elites as ‘bad leaders’ based on past experiences, there is a real possibility that they may play less constructive roles in the future. This is not only because their militants have at times, employed violence, but also due to

¹³ The Vice President position refers to the post designated for a ZAPU representative within ZANU-PF.

the fact that the environmental degradation, caused by climate change/variability, can tempt or push them to sponsor collective violence. As previously mentioned, Mugabe has on other occasions used food as a political weapon by channeling greater shares of agricultural products to predominantly ZANU-PF areas. During the early 2000s such policies, in conjuncture with a severe drought, caused severe food shortages in opposition strongholds such as Bulawayo/Matabeleland-North.¹⁴ Not only did this cause spontaneous anti-government protests, but food queues became virtual recruiting grounds for the opposition (Africa Confidential 2002). If future droughts, caused by climate change/variability, result in similar food crises, one cannot rule out the possibility that opposition elites could instigate their followers to engage in riots by playing on their fears of starvation. But what incentives could opposition elites have for engaging in such spoiling behaviors? One reason could be that ZANU-PF politicians, such as Mnangagwa, have sought to sabotage the new power-sharing government by organizing the arrest of senior MDC dignitaries (ICG 2009: 5). If such actions continue, MDC leaders could come to the conclusion that a show of force is the best strategy to break a political impasse.

4.2.3.2 Weak Institutions in Bulawayo/Matabeleland-North

It was previously argued that strong state institutions constitute a crucial mechanism to overcome the negative, societal effects of climate change/variability. This is bad news for Zimbabwe and Bulawayo/Matabeleland-North, as there is a conspicuous lack of this public good in both the former and the latter. With weak state structures, there is an overt risk that climate change/variability may, in the future, generate different forms of collective violence in this part of Southern Africa. This claim is foremost based on two observations. First, state institutions have, in the past, proven themselves incapable of ensuring the socio-economic well-being of their citizens. In fact, after 2000, Zimbabwe and Bulawayo/Matabeleland-North have suffered from a humanitarian crisis, which has, among other things, resulted in the death of thousands from starvation and cholera. Even if there have recently been some improvements in the state's capacity to deliver socio-economic assistance, it is questionable whether it is enough to fend off future challenges coming from climate change/variability. Second, due to severe deficits in the areas of democratic governance and rule of law, the state appears to be

¹⁴ For more information on this, see the section on Weak Institutions in Bulawayo/Matabeleland-North.

ill prepared to mitigate future conflicts that may arise due to climate change/variability. The following two sections will take a closer look at these two forms of institutional shortcomings and investigate how they can increase the risk of climate change/variability-induced violence in Zimbabwe and Bulawayo/Matabeleland-North.

Inability to Ensure the Socio-Economic Wellbeing of Citizens

Since 1999-2000, with the intensification of political contestation in the country, Zimbabwe has suffered from a massive humanitarian crisis. Nowhere has this been more pronounced than in the area of food security. Once the breadbasket of southern Africa, Zimbabwean cereal production has plummeted sharply since the 2000s. For instance, between 2001 and 2002 the output of maize fell by 2/3, while wheat production decreased by more than half (ICG 2002b: 3). With much less food being produced, large segments of the population were unable to feed themselves. In January 2003 it was estimated that as many as 7.2 million people were at risk of starvation; a figure that had only decreased to 6 million in 2009 (ICG 2003a: 5; 2008b: 8). Food insecurity has especially been a problem in Bulawayo/Matabeleland-North. Being one of the more arid regions of the country means that local communities already have a limited capacity to absorb and mitigate temporary food shocks. This ecological fragility was apparent on several occasions during the 2000s. There were, for example, reports of children dying of starvation in Matabeleland North, as early as 2002 (ICG 2002d: 5). Three years later the situation had deteriorated further, with death tolls reaching 161 in Bulawayo alone (ICG 2004: 6).

Although the immediate origins of the food crisis can be traced back to a serious drought that hit Zimbabwe during the early 2000s, its negative effects were severely amplified by actions taken by the ZANU-PF government (Africa Confidential 2002: 1). In fact, according to one commentator at the time, 'government policies have turned a drought of the kind that has been handled well in the past into a food emergency, creating conditions to use food as a political weapon and deeply undercutting long-term production capabilities' (ICG 2002b: 1). The question then is exactly which type of regime actions were responsible for escalating the food crisis? One of the main reasons for the lack of basic cereals was the manner in which the land reforms were carried out. Initially, the violence committed by war veterans and youth militias on white farms resulted in large tracks of land not being cultivated, decreasing the amount of domestic produce available for consumption (ICG 2001a: 10-11). Officially, this dip in production was to be over-

come once landless, black farmers began cultivating the land. However, due to the nepotistic nature of the ZANU-PF regime, the land reform was severely distorted. Not only was most land given to ZANU-PF loyalists – many of which did not have an interest in developing the land; there was also little assistance – in the form of seed, fertilizers and loans – available to communal farmers (ICG 2002e: 8). As a result, the few black farmers that were actually able to cultivate the newly acquired lands were unable to supply the amounts of cereals needed to alleviate the food crisis.

Another factor that undermined the state institutions' capacity to address the effects of the drought was the direct spoiling behavior of ZANU-PF elites. In fact, many of them benefitted both economically and politically from the food crisis. For example, government monopolies of grain imports and price controls meant that there were few incentives for domestic producers and retailers to sell agricultural products on the open market. Instead, cereals and other agricultural goods were smuggled outside the country, or sold on the black market. Since state officials largely controlled these transactions, many ZANU-PF dignitaries acquired great wealth by exploiting the drought and they subsequently had few incentives to find a solution to the food crisis (Africa Confidential 2004; ICG 2002b: 4; 2002e: 6). In addition, by controlling access to basic food items – through the Grain Marketing Board – ZANU-PF had some political leverage over the opposition. By cutting off food deliveries to MDC strongholds, the government sought to coerce people to support the regime. For example, after losing the district elections in Binga in Matabeleland North in 2002, government officials sealed off food warehouses and prevented local NGOs from providing assistance to needy children (ICG 2002b: 4).

In addition to the significant problems with food security, state institutions have also failed to ensure the well being of citizens in other important areas. One of the most threatening developments in recent years is the breakdown of water supplies and sanitation conditions in urban areas. In 2008 these shortcomings resulted in the outbreak of a cholera epidemic, which by the end of the year had claimed 1,000 lives (ICG 2008b: 1, 8; 2008a:10-11). Lack of water supplies has constituted an especially acute problem in Bulawayo. Due to persistent droughts, population growth, and conflicts between local and national authorities over control of the water supplies, Bulawayo faced its worst water crisis ever in 2008, prompting the local authorities to introduce strict water rationing (Nyoni 2008).

Even with recent improvement of the humanitarian crisis in Zimbabwe and Bulawayo/Matabeleland-North – with more food being available in shops, and the cholera epidemic coming under control – the inability of the state institutions to handle the droughts of the early 2000s provides an indication of their capacity to mitigate environmental shock, induced by climate change/variability, in the future (ICG 2009: 1, 8-9; 2010: 1-3). This pessimistic analysis seems all the more reasonable when taking two additional factors into account. First, despite the inclusion of the two MDC factions into the government, ZANU–PF has been largely successful in its efforts to retain control over state structures and nepotistic channels. There is, hence, a risk that if climate change/variability results in new humanitarian crises, ZANU–PF elites may – as during the 2000s – seek to manipulate food or water shortages for their own personal enrichment or for political purposes. It is not inconceivable that such actions could generate violent reactions. This is especially true when considering that Zimbabweans have not been averse to employing such methods during similar instances in the past. In 1998, for instances, the country was shaken by food riots (ICG 2001a: 11). Meanwhile, in 2005, even the Minister of State Security, Didymus Mutasa, warned that there was a high risk of urban rebellions, in cities such as Bulawayo, due to food shortages (ICG 2005b: 4).

Second, there is a real possibility that the water crisis in Bulawayo will, in the future, escalate into an open political conflict between the national and local authorities – the latter being dominated by the opposition. In 2008 there were reports of the Zimbabwe National Water Agency (ZINWA) seeking to pressure the Bulawayo city council to relinquish control over the town’s water supply. Fearing that ZINWA control would result in severe mismanagement, Bulawayo politicians have refused. Such fears have probably been influenced by the inability of the central government to build a long-promised water pipeline connecting the Zambezi River with Bulawayo (Nyoni 2008). If climate change/variability further decreases precipitation in the Bulawayo/Matabeleland-North area, it is very conceivable that water issues will become increasingly politicized in the coming years. This may not only lead to a radicalization of local political activists, but at worst, escalate into violent clashes between ZAPU, MDC-M and -T supporters on the one hand, and ZANU-PF followers on the other.

Faulty Democratic Institutions and Lack of Rule of Law

Another causal path in which weak institutions and climate change/variability can interact to trigger violence in Zimbabwe in general, and Bu-

lawayo/Matabeleland-North in particular, is through faulty democratic institutions and the lack of rule-of-law. The semi-democratic nature of Zimbabwean institutions has for instance, created uncertainties among the political actors about the rules of the game, and whether they will survive politically in the future. The ZANU-PF regime has, on the one hand, increasingly opened up the political space in Zimbabwe since the late 1980s, through different liberalization measures (Saunders 2010). Opposition parties have, for instance, been free to register themselves and compete in local and national elections. The regime has, on the other hand, continued to employ many authoritarian measures to undermine the opposition's ability to challenge the government; something that has been particularly clear during times of elections. Since 2000, national elections have been fraught with ZANU-PF instigated irregularities such as poll rigging, vote buying, tampering with voter rolls, manipulation of the borders of voting districts, restrictions in the freedom of speech and assembly, as well more physical acts, such as raiding MDC offices, arresting opposition activists and leaders, and torturing and killing MDC supporters.¹⁵ As a key stronghold for MDC, such irregularities have often been especially blatant in Bulawayo. For example, during the 2002 presidential elections, there were twice as many voting stations per voter in the rural areas compared to Bulawayo and other cities, impeding efforts by local voters to cast their votes (ICG 2008a: 12). Meanwhile, in both 2003 and 2008, senior MDC politicians were arrested in the city (Africa Confidential 2003, 2010). Actions such as these have generated fears amongst MDC's members that ZANU-PF would, in the future, seek to dismantle the party completely.

The outcome of the democratization project has, however, not been unproblematic for ZANU-PF either. There have, as previously mentioned, been sustained calls from parts of the opposition to put leading ZANU-PF dignitaries on trial and to dismantle the party's control over state structures that allow them to uphold their nepotistic channels (ICG 2009: 8). If such actions would be implemented, there is a real possibility that ZANU-PF would become an irrelevant political force in the near future; not only because they would lose their most public figures,

¹⁵ Africa Confidential, Africa Confidential, /multiple issues (2005), ICG, 'Zimbabwe: Three Months after the Elections', (International Crisis Group, 2000) at: 2, ICG, 'Zimbabwe: Time for International Action', at: 9, Icg, 'Zimbabwe at the Crossroads: Transition or Conflict?', (International Crisis Group, 2002c) at: 3-4, ICG, 'Zimbabwe: What Next?', (International Crisis Group, 2002a) at: 2, Icg, 'Decision Time in Zimbabwe', (International Crisis Group, 2003b) at: 4-5, ICG, 'Zimbabwe's Continuing Self-Destruction', (International Crisis Group, 2006a) at: 2, ICG, 'Ending Zimbabwe's Nightmare: A Possible Way Forward', (International Crisis Group, 2008b) at: 6.

but also because they would have trouble sustaining support from their constituencies without access to state spoils. Without any substantial political or constitutional reforms, the political uncertainty for ZANU-PF and the two MDC factions is likely to continue in the coming years. This is especially true when considering the instability of the power-sharing agreement between the parties, and the ambiguity about when and how the next national elections will be carried out.

The weakness of the democratic institutions also means that they are ill prepared to regulate future conflicts that may arise as a result of climate change/variability. For example, if rising temperatures result in food and water becoming scarcer, the stakes for the political parties and their followers will increase drastically. Losing elections may thereby not only entail lack of admission to central decision-making bodies, but also starvation and exposure to malnutrition and epidemics. Such daunting scenarios can increase incentives for political actors – such as ZANU-PF – to engage in even more flagrant and violent actions; especially during times of elections. Under similar circumstances opposition parties may become more vigilant with activists demanding the right to use violent means – both to protect themselves and prevent electoral fraud and poll rigging from ZANU-PF officials.

The inability of law enforcement institutions to uphold the rule of law is another dimension that may trigger climate change/variability-induced violence in Bulawayo/Matabeleland-North. Historically, both the police and judiciary have a bad track-record when it comes to taking action against abuses committed by individuals associated with the regime. This was particularly obvious during the farm invasions in the early 2000s. Not only was it common for police units to refuse to intervene as war veterans harassed and killed white farmers and their workers, few of the offenders were prosecuted by the authorities (ICG 2001b: 3-4, 6-9). Such inaction has, however, not been confined to violent campaigns against white farmers; it has also allowed war veterans and youth militias to act with impunity against MDC activists (ICG 2002d: 4; 2002c: 2-3). For example, during the run-up to the 2002 presidential elections war veterans went on a violent rampage in Bulawayo in February, intimidating suspected MDC supporters in the presence of local police.¹⁶ This non-intervention stance has at times, even received, official and public backing; in April 2002 senior ZANU-PF officials

¹⁶ BBC News: War Vets Wreak Havoc in Bulawayo, 14 February 2002. Available at <http://cdnedge.bbc.co.uk/1/hi/world/africa/1820330.stm>. (Last visited 30 March 201).

warned ‘police officers at provincial stations not to intervene in politically motivated events’ (ICG 2002a: 2). If Zimbabwean law enforcement institutions continue to condone similar forms of impunity, there is a real possibility that climate change/variability may in fact lead to violence. For instance, decreased precipitation will, in all likelihood, result in less farmable land in Bulawayo/Matabeleland-North; a development that may generate land disputes between local communities. If such conflicts arise, and the police are seen favoring some communities over others, disadvantaged groups will have incentives to protect their claims by employing arms.

4.2.3.3 Polarized Social Identities

The presence of polarized social identities is a final factor that may hamper efforts to prevent climate change/variability-induced violence. This is particularly true in Zimbabwe and Bulawayo/Matabeleland-North, where past and current abuses have resulted in a radicalization of the Ndebele community. This collective identity is, however, not only based on ethnicity, but also political belonging, wartime identities and perceptions of socio-economic and political marginalization. If climate change/variability results in dwindling access to food and water, there is a real risk that Ndebeles will be further radicalized; especially if they perceive themselves as being unfairly wronged, political parties engage in ethnic outbidding, and Mnangagwa replaces Mugabe as ZANU-PF president. The remaining parts of this section will be devoted to examining the intensity of communal cleavages in Bulawayo/Matabeleland-North and why such polarized social identities – in conjunction with climate change/variability – may trigger armed action.

Radicalization of the Ndebele Community

The polarization of social identities in Bulawayo/Matabeleland-North is largely a product of events leading up to and immediately following independence, current political dynamics, as well as the inability of elites to initiate and support national and local reconciliation efforts. Despite facing a common enemy, in the form of the white minority government of Rhodesia, the liberation movement was unable to uphold a united front, and was subsequently divided along ethnic lines; with ZAPU representing the Ndebeles and the Shonas dominating ZANU. With independence, tensions between the two communities were exasperated, as ZANU and ZAPU engaged in an intense power-struggle. As previously touched upon, this resulted in the Matabeleland massacres of the mid-1980s in which ZANU allied forces killed an estimated 15-20,000

civilians in Bulawayo/Matabeleland-North. The subsequent peace deal between the two factions did little to foster a climate of political and social reconciliation. Not only did the ZANU-PF power-sharing arrangement resemble a capitulation on the part of ZAPU rather than a forum for equal political partnership, but Mugabe's regime refused to conduct reports investigating the public massacres (ICG 2001b: 1).

Although Ndebele dissent was less overt during the late 1980s and early 1990s – a period characterized by growing autocracy, a relatively high standard of living and a strong economy – narratives of the Matabeleland massacres were kept alive in Bulawayo/Matabeleland-North, as were feelings of resentment towards the Mugabe regime (Barclay 2010: 39; ICG 2002c: 8). It was therefore first with the weakening of the ZANU-PF regime and growing socioeconomic crises of the late 1990s that Ndebele grievances came into the open. In 1997 for instance, the Catholic Commission for Justice and Peace in Zimbabwe produced a report to assist the victims of the Matabeleland massacres. The report, which was officially published in 2001, was widely spread in Bulawayo/Matabeleland-North and contributed to keeping the memory of the massacres alive (ICG 2001b: 1; 2005a: 11-12). Due the actions of NGOs, such as the Catholic Commission, and the opening of the political space in the late 1990s, there were increasing demands from the victims of the 1980s killings, to bring those responsible to justice (Africa Confidential 2008; ICG 2003a: 14). Seeking to capitalize on such public cries of outrage, opposition parties – including MDC – began echoing calls for justice and political empowerment of Bulawayo/Matabeleland-North by, for example, proposing the creation of a federal state (Africa Confidential 1999; ICG 2003a: 14). The political mobilization of the Ndebele community was further facilitated by the feelings of fear and anger caused by the political violence instigated by the ZANU-PF regime in the area during the early 2000s (ICG 2005a: 11-12).

The regime has responded in ambiguous ways to the Ndebeles mobilization for judicial action. On the one hand, Mugabe has promised economic damages for the 1980s killings and has conveyed 'regret' for his soldiers' behavior in Bulawayo/Matabeleland-North. Mugabe has, on the other hand, never made good on his promises of compensation and he has not offered a formal apology for the abuses committed by soldiers loyal to ZANU (Africa Confidential 1999). Mnangagwa, who was one of the main architects of the massacres, has had the most belligerent stance, arguing that ZAPU bears responsibility for the events: 'if the ZAPU leadership had accepted that they had lost the elections

and that the number of seats that they had were equal to their popularity and conveyed that message to their forces, then it (Gukurahundi) could not have happened' (Africa Confidential 2004). Due to the intensification of political contestation during the last 12 years, the ZANU-PF regime has also increasingly embraced a radical, identity-based rhetoric. In order to mobilize support in rural Shona areas, the party has revitalized the anti-white, nationalistic discourse of the liberation struggle (ICG 2001b: 4). Within this rhetoric the MDC has been portrayed as western-puppets, controlled and financed by white farmers and British imperialists bent on undermining the revolutionary project of the people (ICG 2002c: 10; 2004: 10; 2010: 12). Such oratory remarks have been used to mobilize support for and train members of the youth militias, thereby directly feeding into the mobilization of violent entrepreneurs (ICG 2002e: 3; 2010: 6).

Overlapping Politicized Identities and the Risk of Climate Change/ Variability Induced Violence

The polarization of social identities in Bulawayo/Matabeleland-North is especially worrisome due to its overlapping nature. This can, as was argued, constitute a problem since social groups that share several common identity markers have a higher likelihood of becoming radicalized and subsequently mobilized for violence. For example, the Ndebele community is not only characterized by ethnic traits, but also broader socio-political markers. Since the opening of the political space in the 1990s, the Ndebele electorate has shifted much of their loyalty to the opposition. As a result Ndebele has increasingly become equivalent with opposition supporter (ICG 2005a: 11-12). Such ethnic-political connotations have been augmented with the appearance of MDC-M and ZAPU, two parties that have focused their electoral strategy on articulating Ndebele grievances. Ethnic and political identities are, furthermore, coupled with feelings of marginalization and neglect, as many Ndebeles believe that Shona-speakers receive preferential treatment when it comes to jobs and education. Finally, wartime identities, based on the sufferings of the 1980s and an idealization of ZAPU feats of the past, are still strong in Bulawayo/Matabeleland-North (Africa Confidential 1999).

A telling example of the sensitive nature that questions of identity and belonging have in Bulawayo/Matabeleland-North – and their potential for violent mobilization – comes from recent rifts over the heritage of Nkomo, the deceased and long time leader of ZAPU. In Matabeleland, Nkomo has increasingly become a cult figure amongst

large segments of the population (Africa Confidential 2010). This has led to a virtual power struggle between MDC and ZANU-PF over the control of his heritage. Case in point, the MDC-dominated city council in Bulawayo renamed Main Street as Joshua Nkomo Street, and taken steps to erect a statue of the ZAPU-leader. The latter idea was, however, plagiarized by Kembo Mohadi – ZANU-PF co-Minister of Home Affairs. Trying to gain political legitimacy for ZANU-PF in Bulawayo/Matabeleland-North, he took personal charge of the construction of the Nkomo statue in Bulawayo (Africa Confidential 2010). However, on completion, there was public outrage when it became clear that the statue was made in North Korea – which had trained the Zimbabwean Fifth Brigade which was responsible for the Matabeleland massacres – and was widely believed to depict Nkomo in an ‘unheroic’ manner (Africa Confidential 2010). One NGO spokesperson expressed local feelings of resentment in the following way: “We cannot have that (the statue) because we will remember our loved ones who were killed through North Korean help every time we see it. There should be no surprises if people uproot or even dynamite it” (Nkala 2010). In fact, veterans in Bulawayo did threaten to pull the statue down. With popular pressure mounting, Mohadi eventually backed down and placed the figure in a local museum (Africa Confidential 2010; Nkala 2010).

There are reasons to believe that polarized social identities may generate violence in Zimbabwe and Bulawayo/Matabeleland-North, especially if the region is severely affected by climate change/variability. If alterations in precipitation and temperature result in less cultivable land, and water, Ndebeles may fear for their future survival. Under such circumstances the latter will be even more likely to seek comfort and security in narrow ethnic networks; especially if state institutions continue to fail to mitigate processes of socioeconomic stress. Climate change/variability therefore has the potential to further radicalize the Ndebeles – a group that is already politically mobilized – thereby increasing the risk of communal tensions escalating into open violence. Such a development is particularly likely if three scenarios unfold. First, if Ndebeles believe they suffer disproportionately from the negative effects of climate change/variability – which is a real possibility considering the ZANU-PF’s manipulation of the drought during the early 2000s – bad leaders may have an easier time to manipulate members of the community to employ arms. Second, violent actions could be the outcome if MDC-M, MDC-T, ZAPU and Ndebele politicians within ZANU-PF engage in ethnic outbidding during times of elections, playing on Ndebeles fears of resource scarcity. Third, there could be an increased risk of violence

if Mnangagwa – who heads one of two factions struggling for power in ZAPU-PF – succeeds Mugabe as President of the party, or even more problematic, if he becomes head of state. Considering that many Ndebeles have a deep aversion to Mnangagwa, anti-ZANU-PF agitation could, under similar circumstances, easily spiral out of control.

4.3 Mozambique

4.3.1 Climate Change/Variability in Mozambique

UNFCCC documents on Mozambique's climatic development describe overall changes in the climate under the assumption of a 'doubling in the global concentration of CO₂ in the atmosphere.' The models suggest that through climate change/variability, simulated for the period 1975-2075, the mean temperature in Mozambique will increase between 1.8°C (Genesis model) to up to 3.1°C (GFDL-R30 and UK89 models). This means that precipitation would decrease between 2 per cent (Genesis) and 11 per cent (GFDL-R30) (UNFCCC 2003: 64).

There will not be any generalizable affect of climate change/variability in Mozambique, considering its geographic length of 2300km. And the impact on the population will also vary considering that coastal areas are typically densely populated and inland areas less populated. The costal populated areas account for 40 per cent of the total population (Chemane et al. 1997: 69). Rainfall in Mozambique varies between 1,400 mm a year near the Zambezi Delta to about 300 mm a year in the lowlands of the southern interior. The hottest region in Mozambique is the interior Zambezi valley.

The biggest challenge that climate change/variability will pose to Mozambique is an excess of water in the form of rainfall/sea water. Therefore, Mozambique, and in particular the Zambezi Basin areas will suffer from increasing floods from the west through the Zambezi, while at the same time from the east it will be affected by sea level rise through increasing amounts of global sea water, and sea level rise through cyclones. Mozambique's coast is prone to tropical cyclone impacts, which are believed to increase due to climate change/variability (Osbaahr et al. 2008: 1953). This interaction of Zambezi floods and sea level rise is already affecting the delta area, particularly Chinde:

There are villages where the coastline has retreated or advanced as much as up to 1 m per year in the last 40 years, e.g. Chinde (Zambezi delta). Erosion has been identified as a serious problem in some regions,

including particularly the city of Beira where many property and infrastructures (e.g. roads) have been already lost (Chemane et al. 1997: 70).

The harbor town Beira in the southern neighboring province of Zambezia, 200km south of the Zambezi delta, is considered extremely vulnerable to sea level rise. It is possible that up to 40 per cent of the city will be inundated by 2100 (Chemane et al. 1997: 77). This would have severe implications for trade in the region: 'Beira is a low lying harbor town of strategic importance for Mozambique and for the hinterland. It is the nearest natural port for Malawi, Zambia and Zimbabwe and other landlocked countries in southern Africa' (Chemane et al. 1997: 70).

The construction of the Kariba and Cahora Bassa dam had a severe impact on the lower Zambezi Basin. Kirchhoff and Bulkey write that when the dams were finished (Kariba dam in 1959 and the Cahora Bassa dam in 1974) 'nearly 90% of the Zambezi catchment has become regulated and the natural flood cycles of the lower Zambezi River are now a phenomenon of the past. Overflows were cyclical in the past, but now are unpredictable and result in severe damaging floods' (Kirchhoff and Bulkley 2008). People in the lower Zambezi (below Cahora Bassa dam) complain about the government's regulation of the dam and the lack of warnings provided when the government releases water. Water levels can change tremendously within hours due to the dams (Beilfuss et al 2002).

In 2001 Mozambique and other parts of south-eastern Africa were heavily affected by floods. Floods increased when the Zambian authorities were forced to release water from Kariba dam after heavy rainfall in the region. In Tete, farmland was flooded, but the Cahora Bassa dam prevented further damage to the lower lying Zambezia province. However, weeks later when a tropical storm hit Mozambique, heavy rain and subsequent flooding affected 250,000 people in Zambezia. With the destruction of many bridges and infrastructure, Quelimane, the provincial capital, was cut off from Pebane and others.¹⁷

The first month's of 2007 saw a major Zambezi flood, affecting four of the central provinces in Mozambique (Tete, Manica, Sofala and Zambezia). Several roads crossing the Zambezi were cut off. The floods in 2007 worsened with Cyclone Favio¹⁸ The World Food Program writes: '285,000 people in Mozambique may need food assistance for the next few months as many have had to flee the rising flood waters, leaving be-

17 <http://www.reliefweb.int/rw/rwb.nsf/AllDocsByUNID/8bd041051917bef8852569eb005e62ae>

18 <http://www.bbc.co.uk/weather/world/news/23022007news.shtml>

hind their meager possessions and food stocks. Early estimates are that 15,000 hectares of crops have been lost in Mozambique.¹⁹ Estimates of flood displaced people range from 50,000 to 300,000. The Natural Disaster Management Institute is quoted with an estimate of 285,000 affected people and 163,000 displaced (Bambaige 2007: 8).²⁰ During floods in 2008 the BBC reported that ‘50,000 people displaced by flooding along Zambezi valley, about 150,000-200,000 people affected.’²¹

In reference to climate variability, the floods in 2010 were preceded by a major drought:

*‘Large amounts of agricultural land have been flooded, particularly along the banks of the Zambezi, causing serious losses to peasant farmers. Luis Pacheco, the Sofala delegate of the country’s relief agency, the National Disasters Management Institute (INGC), told the independent daily “O Pais” that up until the last couple of weeks the main problem farmers in Sofala had faced was drought.’*²²

Moreover, Mozambique experienced unseasonal floods in 2010 in the Zambezi Basin (in June).

4.3.2 Economic Impact of Climate Change/Variability in Mozambique

Mozambique ranks third amongst the African countries most exposed to risks from multiple weather-related hazards, mainly floods and droughts. Even though its economy has been growing at the rate of 8 percent over the past decade, it has one of the lowest per capita GDP in the world (\$397 in 2007), and poverty remains widespread. Mozambique’s growth is also very dependent on its natural capital, foreign financed “megaprojects” and large aid inflows. Several of these projects are dependent of non-renewable natural resources like gas, coal and heavy sands. Agriculture, livestock and fisheries are amongst the most important sectors of Mozambique’s economy. Agriculture contributes about 26% of GDP and employs more than 80 per cent of the labor force in Mozambique, providing livelihoods to the vast majority of its 18 million inhabitants. It is also an important source of foreign exchange

19 <http://www.wfp.org/node/434>

20 http://www.disasterscharter.org/web/charter/activation_details?p_r_p_1415474252_assetId=ACT-145

21 <http://news.bbc.co.uk/2/hi/africa/7182337.stm>

22 <http://allafrica.com/stories/201003110939.html>

Table 12: Mozambique:Area planted to the major food crops, 2002/03 (hectares)

Provinces	Maize	Sorghum	Millet	Rice	Beans	Groundnuts	Cassava
Country Total	1 356 177	515 342	105 821	178 992	424 633	292 537	1 045 625
Total North	346 586	233 816	13 342	55 529	193 616	111 017	637 525
Niassa	139 358	40 055	1 931	4 690	62 518	3 980	25 588
Cabo Delgado	88 805	68 412	4 573	14 933	57 268	45 189	172 958
Nampula	118 423	125 349	6 838	35 906	73 830	61 848	438 979
Total Centre	687 500	241 263	72 409	115 385	124 667	63 833	297 304
Zambezia	215 538	71 514	14 697	83 653	55 095	33 400	280 777
Tete	171 042	59 535	29 070	300	46 222	17 017	1 423
Manica	207 553	49 928	16 903	754	4 661	4 827	14 370
Sofala	93 367	60 286	11 739	30 678	18 689	8 589	734
Total South	322 091	40 263	20 070	8 078	106 350	117 687	110 796
Inhambane	113 149	24 163	10 994	3 448	54 225	77 815	67 604
Gaza	144 221	14 640	9 076	2 900	39 660	28 930	37 076
Maputo	64 721	1 460	0	1 730	12 465	10 942	6 116

Source: (FAO 2003)

earnings. Mozambique has diverse climatic conditions and different types of soils that are suitable for a wide variety of crops and livestock. Agricultural production is predominantly rain fed. About 97 per cent of production takes place on small subsistence farms averaging 1.2 hectares, with very few commercial farms in the country. The use of purchased agricultural inputs (improved seeds, fertilizers and pesticides) is very limited, and crop yields are generally low. Maize is a major staple grown in all regions of the country. Other crops include rice, sorghum, millet, cassava, Irish potatoes, sweet potatoes, beans and a wide variety of vegetables. Cassava is grown mainly in the north where it is the main staple, but it is being introduced along with sweet potatoes under a government initiative, in drought-prone areas throughout the country. The main export crops are tobacco, cotton, cashew, sugar, copra, tea and citrus. Cattle, goats, pigs, sheep and poultry are raised in sizeable numbers across the country (FAO 2003). The average area planted by smallholders is estimated at 1.18 hectares on two or more plots that are

Table 13: Mozambique: Production of major food crops 2002/03, by province ('000 tons)

Provinces	Maize	Sorghum	Millet	Rice (Paddy)	Beans	Groundnuts	Cassava
COUNTRY TOTAL	1 247 897	314 589	48 021	200 439	179 553	109 915	6 149 897
Total North	468 194	158 900	8 343	55 844	94 675	53 869	3 603 781
Niassa	199 556	26 907	1 179	4 225	28 221	1 792	179 118
Cabo Delgado	133 293	48 165	2 966	17 538	33 177	18 050	1 203 284
Nampula	135 345	83 828	4 198	34 081	33 277	34 027	2 221 379
Total Centre	704 940	142 624	34 067	131 865	61 902	28 811	2 062 447
Zambezia	265 461	49 160	8 998	100 845	35 163	19 373	1 965 438
Tete	182 068	26 882	12 037	210	17 050	4 817	7 824
Manica	177 261	25 741	6 942	603	1 462	1 210	7 683
Sofala	80 150	40 841	6 090	30 207	8 227	3 411	81 502
Total South	74 763	13 065	5 611	12 730	22 976	27 235	483 669
Inhambane	28 206	8 580	3 425	2 045	13 127	19 654	347 768
Gaza	30 885	4 047	2 186	7 726	7 500	4 259	123 176
Maputo	15 672	438	0	2 959	2 349	3 322	12 725

Source: (FAO 2003)

generally intercropped. Table 12 shows the estimated areas planted with major food crops during the 2002/03 agricultural season.

Zambezia province is one of the most agriculturally productive provinces in Mozambique (see table 13).²³ Parts of the coastal districts of Pebane, Maganha da Costa and Inhassunge have porous sandy soils. Weather conditions (rainfall and temperature) are favorable for agriculture, especially in the upper Zambezia region. The average farm holding is 1.00 ha; the main food crops are cassava and maize, followed by sorghum, millet, rice, beans and groundnuts, while coconut, cashew and tea are important cash crops. The interior central and north, and the coastal north of Mozambique contains about 45 per cent of the rural households, cultivated fields, and chickens. The dry semi-arid tropics of the central provinces of Zambezia and Tete are also rich in livestock, especially cattle and goats, compared to the other agroecologies. However, the north-western parts of Zambezia province are power

²³ Zambezia is situated north of the Zambezi River, which separates it from the rest of the central region. It borders Malawi to the west and Niassa and Nampula provinces to the north.

Table 14: Mozambique: Crop production in 2002/03 and 2001/02, by region ('000 tons)

Provinces	Maize	Sorghum	Millet	Rice (Paddy)	Beans	Groundnuts	Cassava
North							
2002/03	468 194	158 900	8 343	55 844	94 675	53 869	3 603 781
2001/02	395 780	162 046	8 331	52 549	92 538	52 768	3 530 076
Percentage	18.30	-1.94	0.14	6.27	2.31	2.09	2.09
Centre							
2002/03	704 940	142 624	34 067	131 865	61 902	28 811	2 062 447
2001/02	715 989	134 460	31 959	102 906	57 119	28 214	1 870 030
Percentage	-1.54	6.07	6.60	28.14	8.37	2.12	10.29
South							
2002/03	74 763	13 065	5 611	12 730	22 976	27 235	483 669
2001/02	123 889	17 630	9 209	12 470	27 699	28 805	524 444
Percentage	-39.65	-25.89	-39.07	2.09	-17.05	-5.45	-7.77
Mozambique							
2002/03	1 247 897	314 589	48 021	200 439	179 553	109 915	6 149 897
2001/02	1 235 658	314 136	49 499	167 925	177 356	109 787	5 924 550
Percentage	0.99	0.14	-2.99	19.36	1.24	0.12	3.80

Source: (FAO 2003)

deficit, with only 1 farmer in 50 using animal traction, and 1 in 100 employing a tractor.

Mozambique is vulnerable to climate change/variability due to its geographic location (about 2,700 kilometers of coastline, at the confluence of many international rivers flowing into the Indian Ocean, and land area that is under sea levels), high temperatures, aridness, infertile soils, many endemic diseases, lack of communication infrastructure, high level of illiteracy, high population growth rate, absolute poverty and a high dependence on natural resources that are dependent on precipitation. Agriculture in Mozambique is precarious. The floods of 2000 were one of the worst weather-related rainfall events. Widespread regional drought in 1992 also damaged agricultural production. According to UNFCCC, the Zambezia province (Morrumbala, Mopeia, Chinde, Inhassunge, Namacurra and Maganja da Costa) is amongst one of the most flood vulnerable regions in Mozambique (UNFCCC 2007).

Table 14 compares the production forecasts for the 2002/03 cropping season with those for 2001/02, reflecting the dramatic effect of droughts in the country. The south of the country was the worst affected, but the main fertile maize producing central provinces (including Zambezia) also witnessed a decline in the maize production.

4.3.3 Political Situation in Mozambique

4.3.3.1 Bad Leaders in Mozambique and Zambezia

The presence of malign elites constitutes one of the main grounds for suspecting that climate change/variability-related violence could break out in Mozambique, and particularly in the province of Zambezia. Not only do dignitaries within the FRELIMO-government (Liberation Front of Mozambique) have a history of employing excessive violence, so have most central figures in the country's opposition parties. Therefore there is a high risk that national and local elites may, in the future, sponsor different types of violence if faced with societal problems emanating from severe floods, lack of clean water and food scarcity. Due to the ecological fragility of the region and the important role it plays in national politics, such violent acts are likely to be centered in Zambezia. There are two categories of leaders in particular who would have the capacity and motives to engage in climate change/variability-induced violence: FRELIMO-elites and RENAMO-affiliated dignitaries.

FRELIMO-Elites

During most of its existence, violence has been seen as a legitimate political act by FRELIMO. Formed as a liberation movement in 1962, armed action was at the center of FRELIMO's struggle against the Portuguese colonial authorities. After independence in 1975, which allowed the movement to set up a one-party Marxist-Leninist state, FRELIMO was immediately engulfed in a protracted civil war (1975-92) with the Mozambique National Resistance (RENAMO).²⁴ In order to counter the threat from RENAMO – seen as “South African-backed armed bandits” – the FRELIMO government mobilized Mozambican society to defend the winnings of the revolution, further institutionalizing armed actions as a legitimate tool (AC 2001: 20 April 2001: 4). Even if much of the horrendous atrocities committed during the war can be ascribed to RENAMO, the FRELIMO controlled armed forces had its share of abuses ranging from forced displacement of local communities and pillage raids, to extrajudicial executions and burning of residences with people inside (Schafer 2007: : 77-92; Sumich and Honwana 2007: : 12-13). The belligerent stance taken by the FRELIMO establishment changed first during the late 1980s. Caught in a military stalemate with RENAMO – and receding outside support from USSR – President Joaquim Chissano initiated a more conciliatory policy to-

24 RENAMO was initially known under the acronym MNR.

wards the opposition. Not only was multi-party democracy introduced in 1990, a peace accord was signed with RENAMO in 1992.

Even if Chissano steered FRELIMO in a more liberal direction during the post-war period – working for improved relations with RENAMO and holding the first set of democratic elections in the country’s history (1994 and 1999) – the FRELIMO elite did not hesitate to employ violence when challenged (Africa Confidential 2001). This became especially apparent in the aftermath of the December 1999 national elections. Claiming that RENAMO – which had been transformed into a political party in 1994 – had been robbed of a victory, the party’s President, Afonso Dhlakama, refused to acknowledge defeat and in November 2000 called for national protests. Declaring the demonstrations illegal, the regime sent in police who on several occasions attacked and even shot protesters. The worst abuses were committed in the town of Montepuez in Cabo Delgado, where 116 people – many of them believed to be RENAMO supporters – were killed.²⁵

Since Chissano’s replacement by Armando Guebuza as Head of State and party president in 2005, FRELIMO has taken an even more aggressive stance towards the opposition in general, and RENAMO in particular. Leading the hardline faction of the party – composed of veteran leaders from the liberation struggle who had never been comfortable with Chissano’s political liberalism – Guebuza has sought to crack down on the opposition (Africa Confidential 2001, 2002, 2006). These actions have reawakened fears of a democratic backlash, especially due to Guebuza’s own bleak human rights track record. Not only did he obtain infamy for great harshness as governor of Sofala in the early 1980s, he – as Interior Minister – initiated ‘Operation Production’ in 1983 which forcibly removed thousands of people from Maputo to remote districts (Africa Confidential 2002). As President, Guebuza has also been ultimately responsible for several violent incidents against the opposition. For example, in 2005 at least eight RENAMO supporters were killed by security forces in Mocímboa da Praia, after RENAMO contested the outcome of a mayoral by-election (George 2010).

Considering FRELIMO’s propensity to solve disputes by employing violent means, there are reasons to believe that pro-government elites may also become bad leaders in the future; this is particularly true concerning President Guebuza and the old guard around him. However,

25 83 of the victims died as a result of suffocation and hunger in a local prison. Africa Confidential, Africa Confidential, /multiple issues (2001), Africa Confidential, Africa Confidential, /multiple issues (2010)..

why should we suspect that such violence will be related to climate change/variability and be particularly predominant in Zambezia? As discussed, climate change/variability will in all likelihood hit Zambezia hard. If floods and cyclones result in food shortages, increased prices on basic commodities, and lack of clean water, inhabitants in the province may take to the streets to demonstrate. There is evidence that such collective expressions of frustration could meet harsh retaliation from the authorities. In September 2010, for instance, the security forces responded to widespread food riots by killing 13, injuring about 440 and detaining more than 150 people. One reason for why these types of demonstrations become so violent is that ‘mass and street protests are one of the few ways to express dissatisfaction with a ruling elite seen as arrogant and out of touch’ (Africa Confidential 2010). Any sign of open dissent is liable to be particularly bloody in Zambezia. The area has historically been a key province for any political actor with national ambitions. During the civil war, Zambezia was, for example, possibly the most bitterly disputed part of the country (João Paulo Borges Coelho and Vines 1994b: : 31). With its large population and strategic position – at the mouth of the Zambezi River and the only land route connecting northern and central Mozambique – both FRELIMO and RENAMO invested large resources to control it. Its importance has been just as great in the post-war period. This is partly due to that it – together with Nampula – is the province that has the largest number of representatives in the national parliament, and partly due to that, Zambezia is one of the few provinces that still has a large RENAMO-following.²⁶ It could therefore be crucial for the regime to quickly and decisively quell any demonstrations to prevent RENAMO from politicizing public grievances related to climate change/variability.

Although the FRELIMO regime is most likely to take a reactionary stance when it comes to popular frustration over floods and food insecurity, it may – under certain circumstances – take a more offensive posture. In 2000, for example, rumors spread that Dhlakama was responsible for massive floods, which killed 700 and forced 200,000 to flee their homes. The accusations started after Dhlakama – commenting on the recent 1999 elections – stated in a radio interview that ‘the rain will not stop. The rain will not stop because this election is a fraud. It will rain until we are in power!’ (Africa Confidential 2000; Bertelsen 2002). However astonishing as they sound, such rumors were convinc-

26 In the 2009 national elections Zambezia was the province in which RENAMO achieved its best results, with 39.1 per cent of the votes.

ing for many Mozambicans, due to Dhlakama's royal N'dau descent and his assumed spiritual powers as RENAMO leader.²⁷ Similar accusations, based on traditional beliefs, could give the regime some political maneuverability when it comes to addressing grievances emanating from climate change/variability in the future. For example, had FRELIMO manipulated the rumors about Dhlakama's guilt as a rain-maker, they may have been able to redirect some of the criticism about the government's inadequate responses to the flood against the opposition (Africa Confidential 2000). If resource scarcity is severe enough, and political tensions are soaring, such types of regime disinformation could possibly trigger communal violence between supporters and opponents of the government.

RENAMO Affiliated Elites

Just as FRELIMO leaders, RENAMO elites have a long history of sponsoring acts of brutal violence. The rebel group was initially created by the Rhodesian secret services to function as its extended arm against Zimbabwean guerrillas based in Mozambique. With limited domestic backing, RENAMO at first lacked a clear political agenda. Even if it later articulated a political program of its own – based on a neo-traditional ideology opposing FRELIMO's Marxist policies – RENAMO's mode of operation continued to be dominated by excessive violence throughout the war (Sumich and Honwana 2007: : 12). Abuses such as massacres, mutilations, forced recruitment and systematic pillaging, earned it the epithet the “Khmer Rouge of Africa” (Thomas Ohlson 1998: : 63; Söderberg Kovacs 2007: : 100-01). With the signing of the Rome General Peace Accords RENAMO was – despite widespread expectations to the contrary – largely successful in transforming itself into a viable political party. In fact during the 1990s and 2000s it was the largest opposition force in the country and from 1999 to 2009 the only party, besides FRELIMO, to hold seats in parliament.

Despite its growing democratic credentials, RENAMO has never completely relinquished violence, or the threat of it, as a political tool. Dhlakama and other party dignitaries have on several occasions made more or less overt threats of returning to war. In the aftermath of the regime's repression of RENAMO demonstrations in November 2000, Dhlakama declared that ‘we want power before 2002, and if the issue

27 N'daus is an ethnic group found mainly in southern Manica and Sofala provinces. Bjørn Enge Bertelsen, 'Till the Soil - but Do Not Touch the Bones', (University of Bergen, 2002), p. 182.

is to blow up the country (...) we are prepared and not afraid of anything' (Bertelsen 2002: : 3). Similar warnings were made after the 2004 national elections. Claiming that the process had been fraudulent, the party threatened to boycott the opening of the parliament and go back to war (Söderberg Kovacs 2007: 91). Even if Dhlakama is reputed as an expert on staging "walk outs" and hurling admonitions, threats of rebellion carry some weight due to Dhlakama's possession of a 150-man strong unit of body guards.²⁸ This security outfit has also been engaged in several violent incidents. In August 2004, for example, one policeman died in a shootout in Sofala when police units were trying to arrest two members of Dhlakama's armed group (African Research Bulletin, August 2004: 15882). Such acts of violence have, however, not only been confined to Dhlakama's bodyguards. In May 2000, armed men believed to be RENAMO supporters, attacked a police station in Nampula leaving five people dead (George 2010).

RENAMO's belligerent stance appears to be based on a frustration over being caught in a political impasse. Not only do RENAMO leaders feel that they, due to FRELIMO instigated fraud, have no honest chance to win national elections, they have been unable to gain political concessions through negotiations with the regime (African Research Bulletin, Oct. 1994: 11612; Bertelsen 2002: 164-73; Hanlon and Smart 2008: 95). Such aggravations seem to have increased during Guebuza's presidency, who has taken a more openly anti-RENAMO position. Besides occasional crackdowns against the movement, FRELIMO has gone to great lengths to encourage defections and penetrate traditional RENAMO-strongholds (Africa Confidential 2006; African Research Bulletin, Nov 2008: 17745-17746). In November 2006, for instance, FRELIMO held its national conference in the capital of Zambezia, Quelimane. This prompted a strong reaction from Dhlakama, who quickly organized a special conference of war veterans in the town to underline RENAMO's claims to the province. Dhlakama's reaction must be seen in light of the historical importance given to Zambezia, by RENAMO, as one of the party's most strategic provinces.²⁹ It has, however, been difficult for RENAMO to withstand FRELIMO's incursions into its heartlands. After gaining a majority of the votes in Nampula,

²⁸ Dhlakama is, according to the 1992 Rome Accord, allowed to keep an armed unit of 150 RENAMO fighters to ensure his personal security. Africa Confidential, (African Research Bulletin, (Oxford: African Research Bulletin. Political, Social and Cultural Series), Aug. 2004: 15881.

²⁹ RENAMO's first national conference after the initial 1994 elections was, for example, held in Quelimane. Carrie Manning, 'Constructing Opposition in Mozambique: Renamo as Political Party', *Journal of Southern African Studies*, 24/1 (1998), 161-89 at: 168, 83..

Manica, Niassa, Sofala, Tete and Zambezia in the 1999 national elections, it lost in all 11 of the country's provinces, in 2009.

The former guerrilla group's increasingly vulnerable position is also a function of intense intra-party disputes. Dhlakama's autocratic leadership style – which has systematically sought to prevent potential internal rivals from gaining too much prestige and publicity – has resulted in several senior RENAMO officials creating new political parties (Africa Confidential 2001, 2010). While Raul Domingos, who was the ex-rebel movement's Chief of Staff during the civil war, formed the Party for Peace, Democracy and Development (PPDD) to contest the 2004 elections, Maria José Moreno (RENAMO's parliamentary leader), Eduardo Namburete (RENAMO spokesperson) and Daviz Simango (RENAMO mayor of Beira) founded the Mozambique Democratic Movement (MDM) in 2009 (Africa Confidential 2001, 2004, 2009). PPDD and MDM have sought to establish themselves by taking voters from RENAMO. It was therefore no coincidence that the PPDD held its founding conference in Quelimane in 2003 (African Research Bulletin, Oct. 2003: 15490). The challenge posed by the PPDD and MDM to the former rebel movement has exasperated an already tense political climate. In fact, in June 2009 RENAMO was accused of an alleged assassination attempt against the MDM leader Simango when Dhlakama's security men opened fire against Simango's motorcade (George 2010: : 847).

When considering the willingness of RENAMO leaders – as well as rebel-affiliated elites within MDM and PPDD – to sponsor armed actions in the past, there is a real possibility that they may manipulate climate change/variability-related grievances in the future. This is especially true for Zambezia. For example, Zambezia, has experienced serious problems with cholera epidemics. In a local outbreak in the district of Gurue in early 2010, over 600 people were diagnosed with the disease, of which 19 eventually died. During the height of the epidemic, riots broke out after rumors were circulated that local health workers and traditional leaders were actually spreading, rather than fighting, the disease. The troubles resulted in seven people being lynched.³⁰ This event highlights the explosive character that deteriorating health conditions can have on social stability and gives an indication of what may happen, but on a much larger scale, if Zambezia is hit by a severe flood that destroys local sanitary systems and access to clean

30 All.Africa.com: Mozambique – Seven Deaths in Cholera Violence in Zambezia. Available at <http://allafrica.com/stories/201002190689.html>. (Last visited 29 March 2011).

water. In the event of a major cholera outbreak in the aftermath of such a flood, political entrepreneurs – such as Dhlakama or MDM and PPDD leaders – would be in a good position to manipulate flows of information to mobilize local communities against the government or each other. Dhlakama has also shown that he is not averse to taking advantage of natural disasters to score political points. During the 2000 floods he attacked the FRELIMO-regime, accusing it of focusing rescue and relief operations in southern regions, while neglecting RENAMO strongholds further north (Africa Confidential 2000). The prospect of RENAMO-led violence is especially daunting considering Dhlakama's 150 men strong bodyguard force. Even if these are based in neighboring Sofala, there have been allegations that Dhlakama has recruited ex-RENAMO fighters in Zambezia to reinforce his security outfit (Schafer 2007: 163-64).

The question is, however, what precise motives opposition elites could have to sponsor climate change/variability-related violence? Here it is argued that such a development is particularly likely in the event of one of two scenarios. Such actions could, first, unfold if the FRELIMO government continues its penetration of Zambezia. Even if FRELIMO won a majority of the province's votes in the 2009 elections, Zambezia still holds the largest RENAMO constituency in the country – approximately 39 per cent cast their votes for the former rebel party. Considering the party's belligerent past, it is unlikely that it will give up its core province without a struggle. Second, Dhlakama has announced that he will not lead the party in the next elections (presumably held in 2014). In view of the crucial role Dhlakama plays in RENAMO, there is an imminent risk that his retirement will cause a leadership vacuum and a subsequent power-struggle for the party's presidency. Under such circumstances it can be tempting for certain factions to embrace a more radical discourse and signal a willingness to take more violent actions, in order to rally RENAMO veterans to their cause.

4.3.3.2 Weak Institutions in Mozambique and Zambezia

One of the main obstacles hampering the development of Mozambique is the presence of weak state institutions. Nowhere is this more prevalent than in the northern parts of the country, which have been marginalized in favor of the southern areas around Maputo. Without improving the quality of local services and infrastructure, as well as strengthening democratic institutions and the rule of law, it will be difficult to mitigate the socioeconomic effects of future environmental crises and resolve the conflicts arising from them. This is particularly true in the case of Zambezia, a province that has already suffered much due to floods and

cyclones. At worst, institutional deficiencies, in conjunction with climate change/variability, can generate different forms of collective violence in this area. The remaining two parts will be devoted to giving a more in-depth look at the societal risks associated with having weak institutions in Mozambique and Zambezia.

Inability to Ensure the Socio-Economic Wellbeing of Citizens

Low institutional capacity is nothing new in Mozambique. Upon gaining independence in 1975, FRELIMO inherited a country that had not only suffered from a destructive anti-colonial rebellion, but had also seen its infrastructure sabotaged by departing Portuguese administrators and settlers (Sumich and Honwana 2007: 7). Even if the new regime, inspired by Marxist-Leninist ideals, launched ambitious projects seeking to bring health clinics, schools and water to local communities, such policies of state intervention were soon hampered by RENAMO's rebellion (Sumich and Honwana 2007: 11). During the war, RENAMO – opposed to the government's policy of “socialization of the countryside” – targeted symbols of FRELIMO achievements, such as social projects, transportation infrastructure, educational facilities and health clinics (George 2010: : 842). As a result large tracts of the country, especially the northern areas such as Zambezia, were systematically stripped of infrastructure and state presence (George 2010: 842; Hanlon and Smart 2008: 9).

Despite the massive international presence in Mozambique, in the form of the United Nations Operation in Mozambique (ONUMUZ), little efforts were made to rehabilitate infrastructure and local administrative capacities after the end of the war. This was largely due to the International Monetary Fund's (IMF) reluctance to sponsor post-war reconstruction at the time. Arguing that such actions would lead to national inflation, it refused financial assistance to repair war damages (Hanlon and Smart 2008: 13-14). Those national and international investments that were, in spite of this, still made, tended to be concentrated to Maputo and its immediate surroundings (Africa Confidential 2000). The lack of resources directed to the northern regions has, for example, meant that economic recovery in Zambezia – a key province when it comes to agricultural output – has been slow (Coelho and Vines 1994a: ii, 48; Schafer 2007: 97).

The fragility of Mozambican state institutions becomes apparent when analyzing their capacity to ensure the socioeconomic wellbeing of their citizens. Not only have malnutrition rates increased during much of the 2000s, but only 23 per cent of the rural population had access

to safe drinking water in 2006 (Hanlon and Smart 2008: 56-57, 79). The issue of malnutrition has been an especially large problem in the northern provinces, where as many as 23.7 per cent of the population were found to be undernourished in 2006.³¹ The inability of national and local authorities to provide basic public goods has been particularly evident during times of national disaster. The floods in 2000, for example, left 700 dead and 200,000 displaced. Another 25 were killed and 95,000 forced to flee their homes, in late 2007 and early 2008, when the Zambezi River overflowed. Unable to organize rescue operations and food distribution, the government has been dependent on foreign aid workers and resources to deal with such crises (Africa Confidential 2000; African Research Bulletin: Feb. 2000: 13859, Nov. 2000: 4196, Dec. 2007: 7339; George 2010: 846).

The incapacity of state institutions to deal with health issues and natural disasters in Mozambique and Zambezia gives cause for concern; this is especially true if climate change/variability results in increased precipitation and more severe storms. There is, for example, a high risk that floods will be more extreme in coastal areas, such as Zambezia, in the near future (Africa Confidential 2000). This is not only because the province is placed at the mouth of the Zambezi River, but also because it is regularly affected by cyclones coming in from the Indian Ocean. If such a scenario of increased flooding were to unfold, we can expect an increased probability of different forms of collective violence, such as communal conflicts, breaking out. First, if floods contaminate the water sources used for drinking and hygienic purposes, epidemics, such as cholera, may break out. If severe enough, and coupled with local rumors and suspicions, they can, as was touched upon in the previous section, degenerate into riots. Second, Zambezia is the most populous province in Mozambique. Already now, local and international actors are having trouble feeding flood victims. In December 2007, for example, 520,000 faced starvation after the Zambezi River overflowed its banks (African Research Bulletin). If future floods grow in intensity, destroying valuable farmland, food security could be in even greater jeopardy. At worst increased prices or food shortages could, as in September 2010, generate urban riots pitting protesters against security forces. Finally, floods in Mozambique have always generated huge flows of internal refugees, often in the hundreds of thousands (Africa Confidential 2000; George 2010: 846). If local resources are overstretched when seeking to accom-

31 This was higher than in the southern parts of the country. Africa Confidential, Africa Confidential, /multiple issues (2006).

moderate and assist internally displaced people, there is always the risk that communal conflicts will erupt between newcomers and members of local communities.

Faulty Democratic Institutions and Lack of Rule of Law

Another institutional set of factors that may undermine the state's capacity to prevent climate change/variability-related conflicts, is the democratic deficit and lack of rule of law in the country. This poses a particular problem for Zambezia, due to the intensity of political contestation in the province. The constitutional reforms and liberalization of the political system during the early and mid 1990s had initially given hope that Mozambique could make a successful transition from authoritarian rule to democratic governance. There were, in fact, several positive signs suggesting such a development: a generous multiparty system was introduced, RENAMO succeeded in transforming itself into a political party, and both Dhlakama and Chissano embraced a course of political dialogue after FRELIMO won the first elections in 1994. Even if the opposition was checked when mobilization became too threatening for the regime – as during RENAMO's national protests in November 2000 – electoral fraud was kept at a relatively low level (Africa Confidential 2001; African Research Bulletin, Oct. 1994: 11611-11613).

With Guebuza as President, there has however, been a return to a more autocratic mode of governance. Efforts to circumscribe the opposition have been most visible during times of elections. Fraudulent activities have included vote-rigging, selective application of electoral laws by the National Election Commission (NEC), police and media bias, destruction of opposition party offices and threats against its observers (Africa Confidential 2004, 2009). Similar excesses have also been carried out in Zambezia. During the 2004 elections, for instance, many voting stations never opened, were not located in the correct place or had the wrong voter register. It is estimated that RENAMO lost as many as two parliamentary seats due to this (Hanlon and Smart 2008: 93). The most flagrant breaches were, however, probably carried out five years later, when new elections were held. Fearful of the popular support that the newly formed MDM could muster, the pro-FRELIMO electoral commission excluded MDM candidates from running in nine of the country's 13 constituencies. In fact, FRELIMO was sometimes the sole party contending in some districts (Africa Confidential 2009; George 2010: 847). Actions such as these have raised questions of whether RENAMO has a political future in Mozambican politics, and if the regime will allow parties such as the MDM and PPDD to grow.

If climate change/variability exasperates societal grievances in Mozambique and Zambezia, it is unlikely that the country's democratic institutions will have the capacity and credibility needed to mitigate them. Lack of food and clean water may, for example, force the main political parties to take a more radical stance to defend the interests of their constituencies. If the democratic process is seen as biased during such times of turbulence, political entrepreneurs and their follower's would have incentives to take unilateral, violent actions. A particularly hazardous scenario is if future cyclones and floods result in large flows of displaced people. Even if Mozambique has a long history of dealing with internal refugees from the civil war, it is not clear that local authorities in provinces such as Zambezia would have the capacity to receive, lodge and feed flood-affected people. If refugee camps become more permanent, there is greater risk for electoral complications. Should displaced people vote in their home districts or in the communities that they are residing in? Ambiguities such as these give much leeway for government officials to manipulate voter registration lists; whereby suspected opposition supporters would be unable to cast their votes, not know where to vote or lack the capacity to travel to their designated poll stations. When recalling the fraudulent behavior concerning voting stations in Zambezia in 2004, a similar development is not unthinkable. Electoral tampering such as this could spark local violence, especially if supported by RENAMO, PPDD or MDM affiliated elites.

A final reason why changes in temperature and rainfall patterns can trigger acts of violence in Zambezia is through the lack of a strong judicial system. During Chissano's time in office there were several incidents of regime critics dying as a result of government neglect or murder condoned by FRELIMO-elites. In the aftermath of the November 2000 protests, 83 people who had been rounded up by the police, died of suffocation and starvation while in prison in Montepuez (Africa Confidential 2001). And between 2000 and 2001, two public figures that were investigating bank frauds – Carlos Cardosa (journalist) and António Siba-Siba Macuácuá (central bank official) – were executed in broad daylight by armed men. Initially there were no efforts by the authorities to look into the killings, causing concern about the independence of the judiciary, since senior FRELIMO officials were implicated. Even if seven people – including President Chissano's son Nyimpine Chissano – were eventually convicted for the murder of Cardosa, no-one has been charged with the killing of Macuácuá (African Research Bulletin, Feb. 2005: 16117; Hanlon and Smart 2008: 113-16). Guebuza, and the old guard around him, may not have engaged in the same type

of killings as their predecessors, but they have undermined the autonomy of the country's courts by systematically politicizing independent state institutions (Africa Confidential 2006; Hanlon and Smart 2008: 97, 117). This has had serious repercussions on the efficiency of the judicial system. First, many FRELIMO-elites have been able to influence judges to ensure that they are not prosecuted on charges of corruption. Second, the constitutional court has acted in a manner contrary to its mandate, by condoning electoral tampering carried out by the NEC during the 2009 elections. Finally, national courts have been unable or unwilling to hinder FRELIMO dignitaries from acquiring land illegally (Hanlon and Smart 2008: 96-97).

Efforts to prevent violence caused by ecological distress may, in the future, be impeded if the integrity of Mozambique's judicial system is not strengthened. For example, if the government is unable to handle the societal effects of climate change/variability – such as food insecurity and large refugee flows – there may be calls for independent investigations about how the regime is dealing with these issues. Additionally, if government sponsored violence continues to be directed against 'uncomfortable' individuals, there is not only a risk that the legitimacy of the FRELIMO-regime is undermined, but it may also create incentives for oppositional elements to engage in extra-parliamentary activities. The land issue is another aspect of concern. With more severe and frequent floods, the amount of cultivable land is likely to decrease. If the court system is unable to prevent government elites from grabbing further land in the future, communal conflicts may be the logical outcome. This is particularly true when considering that elite expropriated land has, historically, seldom been used in a productive manner (Hanlon and Smart 2008: 97). Hence, not only can such actions result in less agricultural produce for consumers – increasing food prices, it can also generate resentment from people who have lost their land and income due to floods.

4.3.3.3 Polarized Social Identities in Mozambique and Zambezia

A final factor that could escalate societal grievances, caused by climate change/variability, into open violence is the presence of polarized social identities. Despite ending 19 years ago, the wartime cleavages generated by the civil war still define ideas of collective belonging and social interaction in Mozambique. Nowhere is this more prevalent than in northern provinces, such as Zambezia. The collective identity found in these areas is not merely a function of experiences from the previous armed conflict; but also founded on feelings of socioeconomic margin-

alization and political affiliation. If rising temperatures and precipitation results in refugee flows, food shortages, and contaminated water supplies, there is a substantial risk that local communities will become even more radicalized. Such a development, of increased polarization, can easily trigger collective forms of violence, if harnessed by bad leaders. The following sections will continue by examining the strength of societal cleavages in Mozambique and Zambezia, and explain how climate change/variability can interact with polarized identities to cause armed action.

Segmentation of Wartime Identities

The resilience of wartime identities in Mozambique and Zambezia can be attributed both to the ferociousness of the previous civil war and the dynamics of post-conflict politics. Although RENAMO was, as previously mentioned, largely a creation of the Rhodesian authorities, it did eventually acquire a substantial domestic following. Not only could the guerrilla group play on frustrations over FRELIMO's socialist policies – such as the promotion of collective agriculture and the oppression of traditional leaders, ceremonies and beliefs, it was also able to gain legitimacy by tapping into rural feelings of being discriminated against by urban intellectuals. By channelling these grievances against the regime and promising to reinstate traditional authorities, RENAMO was able to find support in several rural provinces such as Manica, Nampula, Sofala, Tete and Zambezia (George 2010: 842; Schafer 2001; Söderberg Kovacs 2007: 89).

Whereas RENAMO was largely a rural phenomenon concentrated to the north-central parts of the country, FRELIMO received its main support from the inhabitants of Maputo and its immediate surroundings. By vastly expanding the state bureaucracy – to enable it to achieve its Marxist-Leninist aims of creating a modern industrial nation – FRELIMO was able to ensure loyalty from a growing urban proletariat, and a middle-class of civil servants, teachers and nurses. RENAMO's brutal tactics, rural background and dependence on support from white-ruled minority governments in Rhodesia and later South Africa, meant that the rebels were commonly referred to as foreign-backed, uncivilized bandits from the bush (Africa Confidential 2001; Coelho and Vines 1994a: 7). However, as RENAMO established itself in larger parts of the country, and was finally able to fight the government to a standstill, FRELIMO was obliged to acknowledge that the rebels had an important following and represented legitimate grievances.

After the end of hostilities in 1992, and the subsequent democratization process, wartime identities have, to a large extent, been segmented rather than dissolved. This is presumably due to two reasons. First, Mozambican elites have not sponsored any national reconciliation initiatives, such as the setting up of a truth and reconciliation commission, after the signing of the Rome Accord (Hanlon and Smart 2008: 10.). The leaders of the two former belligerents, have instead agreed to not dwell in the past and have only occasionally made symbolic acts or statements in support of national reconciliation (Brounéus 2008). To some extent, reconciliation has at least at the local level still happened. For example, the social acceptance of ex-FRELIMO and RENAMO combatants has been facilitated in many war affected communities through the organization of different ceremonies; either in the form of traditional cleansing rituals or services held by local churches or mosques (Lundin 1998; Schafer 2007). However, there is no evidence that such grass-root initiatives have had a substantial affect on the more aggregate political level. On the contrary, as we have seen, relations have continued to be tense between RENAMO and FRELIMO leaders and followers, occasionally bursting out into violence.

Second, despite the arrival of peace, politicians have, especially during election campaigns, continued to employ wartime stereotypes in their rhetoric, belittling their opponents and awarding them crude qualities. FRELIMO-elites habitually describe RENAMO as savage and wild bandits, only capable of killing. To underline their point they often invoke acts of violence committed by the rebels in the past. On the other hand, they award heroic qualities to themselves, stressing FRELIMO's role in liberating the country (Bertelsen 2002: 2-3, 153, 66-70). Meanwhile, RENAMO representatives often portray their opponents as corrupt, undemocratic usurpers of power, set on 'de-Africanizing' the country by destroying traditional beliefs and structures, and see themselves as moral victors of fraudulent elections and champions of traditional Mozambique (Bertelsen 2002: 2-3, 166-70). According to Bertelsen, such rhetorical devices are 'aimed at capitalizing on popular social memory, tentatively drawing on and endeavoring to shape experiences for electoral support.' It is easy to see how such antagonistic discourses have not facilitated the processes of creating a new, less radical, collective Mozambican identity.

There is an overwhelming risk that these wartime identities will continue to define social and political life in the country in the coming years. With Guebuza's ascent to power, FRELIMO has rejuvenated the party's old revolutionary rhetoric, calling for 'sacrifice' and 'patriotic

enthusiasm'. This has fallen well with the old veterans of the liberation struggle, which constitutes Guebuza's powerbase (Africa Confidential 2006, 2010). Such echoes from the past are, however, unlikely to dampen RENAMO's fears for its political future. Furthermore, even if several new opposition parties have appeared during the last few years (PPDD and MDM), it is unlikely that they will contribute to the construction of new, more inclusive social identities. As de facto splinter groups of RENAMO, they will presumably be caught in the same wartime rhetoric as the former rebel group.

Overlapping Politicized Identities and the Risk of Climate Change/ Variability Induced Violence

A complicating factor is that old wartime identities largely overlap with other social markers of belonging in Mozambique. This is especially true when it comes to communities that generally supported RENAMO during the war. Since the latter are mainly located in the northern parts of the country, they have – as previously mentioned – had less access to investments and infrastructure rehabilitation. This has created widespread resentment and frustration among northerners, generating accusations of regional discrimination (Africa Confidential 2000, 2009). RENAMO and Dhlakama have systematically sought to play on such feelings of marginalization during political rallies, further entrenching the image of a North-South divide in the consciousness of people (Africa Confidential 1994: 1). Post-war political affiliations have, finally, also contributed to segmenting wartime identities, as opposition parties, such as RENAMO and MDM, have had most electoral success in areas that the rebels dominated during the armed conflict (Nampula, Sofala and Zambezia). Of Mozambique's provinces, Zambezia is probably the one with the highest degree of overlapping identities. This is not only because RENAMO controlled large parts of the province during the war, Zambezia also has a long history of being socioeconomically marginalized and currently has the largest RENAMO following in the country (Coelho and Vines 1994a: 33). This is one of the reasons for why we can expect future violence in Zambezia; with overlapping polarized social identities, local communities will be less moderate and more susceptible to elite manipulation.

The question is how such violence could be related to climate change/variability? If Zambezia is particularly exposed to natural calamities, such as floods and food shortages local communities could, for example, become even more radicalized and North/South cleavages further segmented. There were, in fact, signs of this already during the 2000

floods. According to some commentators at the time ‘animosity between RENAMO and FRELIMO has worsened because foreign investment – and flood related aid money – is concentrated in the south, the ruling party’s heartland’ (Africa Confidential 2000).” If a similar development would take place in the aftermath of coming floods, and FRELIMO continues its political offensive against RENAMO in Zambezia, it could be tempting for the latter to mobilize radicalized communities against the regime. This is particularly true for a specific sub-category of individuals where social identities are quite strong: ex-rebel fighters. Even though it is almost two decades ago since they demobilized, many continue to identify themselves with RENAMO and actively take part in local and national politics (Schafer 2007: 134). At times, this group of individuals has taken extreme stances. After the 2009 elections, for example, a group of former RENAMO fighters threatened to return to war if voting was not redone (Africa Confidential 2009). As an agrarian community, most ex-combatants in Zambezia receive their income from farming, plantation work or petty-trade of agricultural produce (Coelho and Vines 1994b; Schafer 2007: 117-18). Future overflows of the Zambezi River therefore constitute a major threat to the ex-rebels’ and their families’ economic wellbeing. If they were to lose their jobs as a result of climate change/variability, one cannot exclude the possibility that they would use violence to express their grievances or gain alternative sources of income.

The aim of this study has been to identify areas in the Zambezi River Basin that are prone to the risk of violent conflicts (collective violence, popular unrest) induced by climatic changes/variability.

The study argues that climate change/variability will have a significant impact on the socio-economic system, and thus affect the life of millions of poor people in the region. However, it is unlikely that the socioeconomic impact of climate change/variability will cause conflict on its own. The quality of governance, particularly the role of elites, institutions and social identities, are crucial and can make the difference between adaptation or confrontation.

Exposure to climate change/variability of the regions has been measured, taking into account the impact of existing socio-economic and political factors. Taking note of the ecological impact, the study focuses on socio-economic and political problems that are multiplied by climate change/variability impacts. Weak and partisan political structures adversely affect the governance of natural resources, and hence, are linked to a weakened mitigation and adaptation capacity of societies to the negative effects of climate change/variability. Bad leaders, weak institutions and polarized social identities – that were maintained over years due to a lack of reconciliation in the aftermath of civil wars and overall liberation struggles – appear to have the potential to be the tipping points for causing conflict.

This study identifies Bulawayo/Matabeleland-North region in Zimbabwe and the Zambezi Province in Mozambique as two regions that are most likely to experience climate induced violent conflicts. The following factors are behind their selection:

- a) Climate change/variability will bring severe water scarcity in Bulawayo/Matabeleland-North; and cause high floods, sea-level rise, and costal erosion in the Zambezia Province.

- b) Matebeleland North is amongst the poorest parts and most vulnerable to climate change/variability. The area under maize production (the staple crop of the area) has seen some of the sharpest declines in Matabeleland. A decline in agriculture production combined with political stressors thus amplifies the real potential for violent conflict in the region. In addition the other high-risk region, the Zambezia province, is one of the most fertile parts of Mozambique, which accounts for a large share of the country's agricultural production. Given that Mozambique is amongst the third worst affected countries in Africa with respect to floods and droughts, makes its agricultural production especially vulnerable. This situation has the potential to result in a catastrophe that will harm agricultural production, given the recent record and impact of climate change/variability. In recent years, the negative shocks from floods and droughts have been limited to the southern provinces with a relatively minor effect on Zambezia. However, it is likely that with the increased stress of climate change/variability, this relatively prosperous province might become increasingly vulnerable.
- c) Bulawayo/Matabeleland-North and Zambezia are both suffering from poor political governance, bad leaders, weak institutions, and polarized social identities. National and local elites have a history of sponsoring violence in the two provinces, and they have not been averse to manipulating humanitarian crises and resource scarcity for their own political purposes. State institutions have furthermore been largely unable to ensure the socioeconomic wellbeing of inhabitants of these two regions and are ill-prepared to mitigate future conflicts arising from climate change/variability.

It is very likely that the Bulawayo/Matabeleland-North and Zambezia regions in southern Africa will witness climate induced violent conflicts in the near future. Violence will further reduce the adaptation ability of society to climate change/variability related challenges. Survival threats posed by climate change/variability will be further multiplied by violent conflict, resulting in a serious humanitarian crisis in the southern African region. Thus, it is first important to find possible ways to identify and assess the climate change/variability induced vulnerability factors in these two regions. They follow it with swift and smart support to improve political and social institutions to create a better governance structure to address these vulnerabilities.

Existing political regimes and the prevailing post-colonial mindset make the transformation process at the state level institutions problem-

atic. With their refusal to change they become a liability to any process supporting and promoting societal change. In this context, the focus of external support should be directed towards creating and/or nurturing local institutions to be representative, effective and transparent. Civil society organizations and groups in the climate vulnerable regions can be identified and supported to help lead this process of institutional change. While the state regimes are reluctant, the role of regional and sub-regional organizations like the African Union (AU) and South African Development Cooperation (SADC) are crucial to facilitating this local institution building process. They need to play a critical role in strengthening the local institutional capabilities of vulnerable areas and societies.

References

- Abalu, G. and Hassan, R (1998), 'Agricultural productivity and natural resource use in southern Africa', *Food Policy*, 23, 477-90.
- AC (2001), (20 April London: Africa Confidential).
- Africa Confidential (1994), Africa Confidential, (4 November).
- Africa Confidential (1999), Africa Confidential, (multiple issues).
- Africa Confidential (2000), Africa Confidential, (multiple issues).
- Africa Confidential (2001), Africa Confidential, (multiple issues).
- Africa Confidential (2002), Africa Confidential, (multiple issues).
- Africa Confidential (2003), Africa Confidential, (multiple issues).
- Africa Confidential (2004), Africa Confidential, (multiple issues).
- Africa Confidential (2005), Africa Confidential, (multiple issues).
- Africa Confidential (2006), Africa Confidential, (multiple issues).
- Africa Confidential (2008), Africa Confidential, (multiple issues).
- Africa Confidential (2009), Africa Confidential, (multiple issues).
- Africa Confidential (2010), Africa Confidential, (multiple issues).
- African Research Bulletin (Oxford: African Research Bulletin. Political, Social and Cultural Series).
- Allen, Myles R. and Ingram, William J. (2002), 'Constraints on future changes in climate and the hydrologic cycle', *Nature*, 419 (6903), 224-32.
- Arnell, N.W. (2004), 'Climate change and global water resources: SRES emissions and socio-economic scenarios', *Global Environmental Change*, 14 (1), 31-52.
- Bambaige, Albertina (2007), 'National Adaptation Strategies to Climate Change Impacts. A Case Study of Mozambique.', *Human Development Report 2007/2008. Fighting climate change: Human solidarity in a divided world.*
- Bar-Tal, D. (1998), 'Societal beliefs in times of intractable conflict: The Israeli case', *International Journal of Conflict Management*, 9 (1), 22-50.
- Bar-Tal, D. (2000), 'Shared Beliefs in a Society', *Social Psychological Analysis*.
- Barclay, Philip (2010), *Zimbabwe: Years of Hope and Dispair* (London, Berlin & New York: Bloomsbury).
- Barnett, Jon and Adger, W. Neil (2007), 'Climate change, human security and violent conflict', *Political Geography*, 26 (6), 639-55.
- Beck, Lucas and Bernauer, Thomas (2010), 'Water Scenarios for the Zambezi River Basin, 2000-2050', *Climate Change and Security*, the 250th Anniversary Conference organized for The Royal Norwegian Society of Sciences and Letters (Trondheim, Norway).
- Bertelsen, Bjørn Enge (2002), 'Till the Soil - but Do not Touch the Bones', (University of Bergen).
- Bhatia, Michael Vinay and Muggah, Robert (2009), 'The Politics of Demobilization in Afghanistan', in Robert Muggah (ed.), *Security and Post-Conflict Reconstruction: Dealing with Fighters in the Aftermath of War* (London and New York: Routledge), 126-64.

- Biswas, Ranjita (1993), 'Mother Chilika Fights off an Invasion of Prawns', *Panscope*, 37.
- Bøås, Morten and Dunn, Kevin C. (2007), 'African Guerilla Politics: Raging Against the Machine?', in Morten Bøås and Kevin C. Dunn (eds.), *African Guerillas: Raging Against the Machine* (Boulder and London: Lynne Rienner Publishers), 9-37.
- Boege, V (2009), 'Transboundary water governance in regions of weak statehood', in Larry Swatuk and Lars Wirkus (eds.), *Transboundary Water Governance in Southern Africa* (Baden-Baden: Nomos), 31-46.
- Bohle, Hans G., Downing, Thomas E., and Watts, Michael J. (1994), 'Climate change and social vulnerability: Toward a sociology and geography of food insecurity', *Global Environmental Change*, 4 (1), 37-48.
- Boko, Michel, et al. (2007), 'Chapter 9 - Africa', in M.L. Parry, et al. (eds.), *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007* (Cambridge and New York: Cambridge University Press).
- Boston, Richard (1992), 'A country dying of thirst as drought conditions prevail', *The Guardian*, 2 September.
- Brounéus, Karen (2008), 'Analyzing Reconciliation: A Structured Method for Measuring National Reconciliation Initiatives', *Journal of Peace Psychology* 14 (3), 291-313.
- Brown, Michael E (ed.), (1996), *The International Dimensions of Internal Conflict* (Cambridge: The MIT Press) 1-653.
- Brown, Oli and Crawford, Alec (2009), 'Climate Change and Security in Africa - A Study for the Nordic-African Foreign Ministers Meeting', (International Institute for Sustainable Development).
- Bruinsma, J. (2003), *World agriculture: towards 2015/2030: an FAO perspective* (London: Earthscan/James & James).
- Buhaug, Halvard, Gleditsch, Nils Petter, and Theisen, Ole Magnus (2008), 'Implications of Climate Change for Armed Conflict', (Washington, DC: World Bank Group).
- Buhaug, Halvard and Urdal, Henrik (2009), 'An Urbanization Bomb? Population Growth and Social Disorder in Cities', (Oslo: International Peace Research Institute (PRIO)).
- Burke, MB, et al. (2009), 'Warming increases the risk of civil war in Africa', *Proceedings of the National Academy of Sciences*, 106 (49), 20670.
- CEEPA (2006), 'Climate change and African Agriculture', Policy Note No. 11, (August 2006).
- Challinor, A.J., et al. (2006), 'Assessing the Vulnerability of Crop Productivity to Climate Change Thresholds Using an Integrated Crop-climate Model', in Hans Joachim Schellnhuber, et al. (eds.), *Avoiding Dangerous Climate Change* (Cambridge: Cambridge University Press), 187-94.
- Chemane, David, Motta, Helena, and Achimo, Mussa (1997), 'Vulnerability of coastal resources to climate changes in Mozambique: a call for integrated coastal zone management', *Ocean & Coastal Management*, 37 (1), 63-83.
- Clarke, Rabin (1991), *Water: The International Crisis* (London: Earthscan).
- Coelho, Joao Paulo Borges and Vines, Alex (1994a), 'Pilot Study on Demobilization and Re-Integration of Ex-Combatants in Mozambique', (Oxford: Refugee Studies Programme, Queen Elizabeth House, University of Oxford), 1-70.
- Coelho, João Paulo Borges and Vines, Alex (1994b), 'Pilot Study on Demobilization and Re-Integration of Ex-Combatants in Mozambique', (Oxford: Refugee Studies Programme, Queen Elizabeth Hous, University of Oxford).

- Collier, P, Conway, G, and Venables, T (2008a), 'Climate change and Africa', *Oxford Review of Economic Policy*, 24 (2), 337.
- Collier, P. and Goderis, B. (2009), 'Does aid mitigate external shocks?', *Review of Development Economics*, 13 (3), 429-51.
- Collier, Paul, Conway, Gordon, and Venables, Tony (2008b), 'Climate change and Africa', *Oxford Review of Economic Policy*, 24 (2), 337-53.
- Collier, Paul et al. (2004), 'On the Duration of Civil War', *Journal of Peace Research*, 41 (3), 253-73.
- de Waal, A. and Whiteside, A. (2003), 'New variant famine: AIDS and food crisis in southern Africa', *Lancet*, 362, 1234-37.
- Dell, M, Jones, B, and Olken, B (2008), 'Climate Shocks and Economic Growth: Evidence from the Last Half Century', NBER Working Paper, (14132).
- Dell, M, Jones, B, and Olken, B (2009), 'Temperature and Income: Reconciling New Cross-Sectional and Panel Estimates', *American Economic Review Papers and Proceedings*.
- Douglas, I, et al. (2008), 'Unjust waters: climate change, flooding and the urban poor in Africa', *Environment and Urbanization*, 20 (1), 187.
- Ebi, K.L., et al. (2005), 'Climate suitability for stable malaria transmission in Zimbabwe under different climate change scenarios', *Climatic Change*, 73 (3), 375-93.
- Ellingsen, Tanja (2000), 'Colorful Communities or Ethnic Witches' Brew? Multiethnic and Domestic Conflict During and After the Cold War', *Journal of Conflict Resolution*, 44 (2), 228-49.
- Eriksen, S., O'Brien, K., and Rosentrater, L. (2008), 'Climate Change in Eastern and Southern Africa Impacts, Vulnerability and Adaptation', GECHS Report 2008:2 (Oslo: Department of Sociology and Human Geography, University of Oslo).
- Falkenmark, M. (1990), 'Global water issues confronting humanity', *Journal of Peace Research*, 27 (2), 177.
- FAO (2003), 'FAO Global Information and Early Warning System on Food and Agriculture World Food Programme, Special Report, FAO/WFP Crop and Food Supply Assessment Mission to Mozambique', (20 June 2003).
- FAO (2010), 'AQUASTAT - FAO's Information System on Water and Agriculture', <<http://www.fao.org/nr/water/aquastat/main/index.stm%3E>, accessed 10 February
- FAO Land and Water Development Division (1997), 'Irrigation potential in Africa: A basin approach', *FAO LAND AND WATER BULLETIN*, 4.
- Gallup, JL and Sachs, JD (2001), 'The Economic Burden of Malaria', *American Journal of Tropical Medicine and Hygiene*, 64, 85-96.
- Gallup, JL, Mellinger, A, and Sachs, JD (1999), 'Geography and Economic Development', *International Regional Science Review*, 22 (2), 179-232.
- George, Edward (2010), 'Mozambique: Recent History', in Routledge (ed.), *Europa Regional Surveys of the World: Africa South of the Sahara 2011* (London & New York: Routledge), 842-48.
- German Advisory Council on Global Change (2007), 'Climate Change as a Security Risk', (London and Sterling).
- Glantz, M.H., Betsill, M., and Crandall, K. (1997), 'Food security in southern Africa. Assessing the use and value of ENSO information', (Boulder, CO, USA: National Center for Atmospheric Research).
- Gleditsch, Nils Petter (1998), 'Armed Conflict and the Environment: A Critique of the Literature', *Journal of Peace Research*, 35 (3), 381-400.
- Gleick, Peter (1993), 'Water and Conflict', *International Security*, 18 (1), 79-112.

- Gleick, Peter (ed.), (2009), *The World's Water 2008-2009* (London: Island Press).
- Gurr, Ted R. (1970), *Why Men Rebel* (Princeton, NJ: Princeton University Press).
- Gurr, Ted Robert (2000), *Peoples Versus States: Minorities at Risk in the New Century* (Washington D.C.: United States Institute of Peace Press).
- Haile, M (2005), 'Weather patterns, food security and humanitarian response in sub-Saharan Africa', *Philosophical Transactions of the Royal Society B: Biological Sciences*, 360 (1463), 2169.
- Hanlon, Joseph and Smart, Theresa (2008), *Do Bicycles Equal Development in Mozambique?* (Woodbridge: James Currey).
- Harrison, GP and Whittington, HBW (2002), 'Susceptibility of the Batoka Gorge hydroelectric scheme to climate change', *Journal of Hydrology*, 264 (1-4), 230-41.
- Harsch, E. (1992), 'Drought Devastates Southern Africa', *Africa Recovery*, (April).
- Hegre, Håvard, et al. (2001), 'Toward a Democratic Civil Peace? Democracy, Political Change, and Civil War, 1816-1992', *American Political Science Review*, 95 (1), 33-48.
- Holding, P.A. and Snow, R.W. (2001), 'Impact of Plasmodium falciparum malaria on performance and learning: review of the evidence', *American Journal of Tropical Medicine and Hygiene*, 64, 68-75.
- Howden, S.M., et al. (2007), 'Adapting agriculture to climate change', *Proceedings of the National Academy of Sciences*, 104, 19691-96.
- ICG (2000), 'Zimbabwe: Three Months after the Elections', (International Crisis Group).
- ICG (2001a), 'Zimbabwe: Time for International Action', (International Crisis Group).
- ICG (2001b), 'Zimbabwe in Crisis: Finding a Way Forward', (International Crisis Group).
- ICG (2002a), 'Zimbabwe: What Next?', (International Crisis Group).
- ICG (2002b), 'Zimbabwe: The Politics of National Liberation and International Division', (International Crisis Group).
- ICG (2002c), 'Zimbabwe at the Crossroads: Transition or Conflict?', (International Crisis Group).
- ICG (2002d), 'All Bark and No Bite? The International Response to Zimbabwe's Crisis', (International Crisis Group).
- ICG (2002e), 'Zimbabwe's Election: The Stakes for Southern Africa', (International Crisis Group).
- ICG (2003a), 'Zimbabwe: Danger and Opportunity', (International Crisis Group).
- ICG (2003b), 'Decision Time in Zimbabwe', (International Crisis Group).
- ICG (2004), 'Zimbabwe: Another Election Chance', (International Crisis Group).
- ICG (2005a), 'Post-Election Zimbabwe: What Next?', (International Crisis Group).
- ICG (2005b), 'Zimbabwe's Operation Murambatsvina: The Tipping Point?', (International Crisis Group).
- ICG (2006a), 'Zimbabwe's Continuing Self-Destruction', (International Crisis Group).
- ICG (2006b), 'Zimbabwe: An Opposition Strategy', (International Crisis Group).
- ICG (2007), 'Zimbabwe: An End to the Stalemate?', (International Crisis Group).
- ICG (2008a), 'Zimbabwe: Prospects from a Flawed Election', (International Crisis Group).
- ICG (2008b), 'Ending Zimbabwe's Nightmare: A Possible Way Forward', (International Crisis Group).
- ICG (2008c), 'Negotiating Zimbabwe's Transition', (International Crisis Group).

- ICG (2009), 'Zimbabwe: Engaging the Inclusive Government', (International Crisis Group).
- ICG (2010), 'Zimbabwe: Political and Security Challenges to the Transition', (International Crisis Group).
- IPCC (2001), *Climate Change 2001: Impacts, adaptation, and vulnerability. Contribution of working group II to the third assessment report of the intergovernmental panel on climate change* (Cambridge: Cambridge University Press).
- IPCC (2007), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)] (Cambridge, United Kingdom and New York, USA: Cambridge University Press).
- IPCC (2011), 'IPCC statement on the melting of Himalayan glaciers', <<http://www.ipcc.ch/pdf/presentations/himalaya-statement-20january2010.pdf%3E>, accessed 24 February.
- Jones, B and Olken, B (2010), 'Climate Shocks and Exports', *American Economic Review: Papers & Proceedings*, 100 (May), 454-59.
- Kirchhoff, Christine J. and Bulkley, Jonathan W. (2008), 'The Zambezi River Basin: Potential for Collaborative Resource Research', UCOWR Conference (Southern Illinois University Carbondale).
- Klandermans, Bert (2003), 'Collective Political Action', in David O. Sears, Leonie Huddy, and Robert Jervis (eds.), *Oxford Handbook of Political Psychology* (Oxford: Oxford University Press), 670-709.
- Kostić, Roland (2007), 'Ambivalent Peace: External Peacebuilding, Threatened Identity and Reconciliation in Bosnia and Herzegovina', (Uppsala University).
- Kostić, Roland, Krampe, Florian, and Swain, Ashok (forthcoming, 2011), 'Liberal Statebuilding and Environmental Security - The International Community Between Trade-off and Carelessness', in A Swain, Ramses Amer, and Joakim Öjendal (eds.), *The Development and Security Nexus* (London: Anthem Press).
- Krampe, Florian (2010), 'Transforming Identities: Belligerents and Reconciliation in South Africa and Zimbabwe', *Theory vs. Policy? Connecting Scholars and Practitioners* (New Orleans Hilton Riverside Hotel, The Loews New Orleans Hotel, New Orleans, LA).
- Krampe, Florian and Melber, Henning (2010), 'Angola and Mozambique - Honeymoon after Civil War?', *New routes*, 15 (4), 17-20.
- Krieger, Norma (1995), 'The Politics of Creating National Heroes: The Search for Political Legitimacy and National Identity', in N Bhebe and T Ranger (eds.), *Soldiers in Zimbabwe's Liberation War* (Harare: University of Zimbabwe Publications).
- Kruger, Norma (2003), *Guerilla Veterans in Post-War Zimbabwe: Symbolic and Violent Politics 1980-1987* (Cambridge: Cambridge University Press).
- Lanegran, Kimberly (2001), 'South Africa's 1999 Elections: Consolidating a Dominant Party System', *Africa Today*, 48 (2), 81-102.
- Le Houérou, HN (1996), 'Climate change, drought and desertification', *Journal of Arid Environments*, 34 (2), 133-86.
- Lee, James R. (2009), *Climate Change and Armed Conflict. Hot and Cold Wars*, eds Tom Woodhouse and Oliver Ramsbotham (Routledge studies in peace and conflict resolution; New York: Routledge).
- Lerche, Charles O. (2000), 'Truth Commissions and National Reconciliation: Some Reflections on Theory and Practice', *Peace and Conflict Studies*, 1 (7).

- Levina, E. (2006), 'Domestic Policy Frameworks for Adaptation to Climate Change in the Water Sector Part II: Non-Annex I Countries. Lessons Learned from Mexico, India, Argentina and Zimbabwe', (Paris: OECD).
- Lewis, Anthony (9 March 1981), 'Letter from Zimbabwe', *The New Yorker*.
- Lijphart, Arend (1977), *Democracy in Plural Societies. A Comparative Exploration* (New Haven and London: Yale University Press).
- Lundin, Iraê Baptista (1998), 'Mechanisms of Community Reception of Demobilised Soldiers in Mozambique', *African Journal of Political Science*, 3 (1), 104-18.
- Lundwall, K (2001), *Psychological Aspects of Collective Violence and Reconciliation: A Survey of Current Research* (Uppsala: Centre for Multiethnic Research).
- Lyons, Terrence (2005), *Demilitarizing Politics: Elections on the Uncertain Road to Peace* (Boulder and London: Lynne Rienner Publishers).
- Machlis, Gary E. and Hanson, Thor (2008), 'Warfare Ecology', *BioScience*, 58 (8), 729-36.
- Magadza, CHD (1994), 'Climate change: some likely multiple impacts in southern Africa', *Food Policy*, 19 (2), 165-91.
- Manning, Carrie (1998), 'Constructing Opposition in Mozambique: Renamo as Political Party', *Journal of Southern African Studies*, 24 (1), 161-89.
- Mano, R. and Nhemachena, C. (2007), 'Assessment of the Economic Impacts of Climate Change on Agriculture in Zimbabwe: A Ricardian Approach', CEEPA discussion paper 11.
- Markakis, John (2003), 'Anatomy of a Conflict: Afar & Ise Ethiopia', *Review of African Political Economy*, 30 (97), 445-53.
- McMichael, A.J., Woodruff, R.E., and Hales, S. (2006), 'Climate change and human health: present and future risks', *The Lancet*, 367 (9513), 859-69.
- Mendelsohn, R., Dinar, A., and Dalfelt, A. (2000a), 'Climate change impacts on African Agriculture. Preliminary analysis prepared for the World Bank', (Washington, District of Columbia: World Bank).
- Mendelsohn, R., Dinar, A., and Dalfelt, A. (2000b), 'Climate change impacts on African agriculture', (Centre for Environmental Economics and Policy in Africa).
- Mendelsohn, R. and Dinah, A. (2005), 'Exploring Adaptation to Climate Change in Agriculture: the Potential of Cross-sectional Analysis', *ARD*, World Bank, (1).
- Mendelsohn, Robert (2009), 'The Impact of Climate Change on Agriculture in Developing Countries', *Journal of Natural Resources Policy Research*, 1 (1), 5 - 19.
- Min, Seung-Ki, et al. (2011), 'Human contribution to more-intense precipitation extremes', *Nature*, 470 (7334), 378-81.
- Mohamed-Katerer, Jennifer (unpublished), 'Climate Change, Natural Resource Governance and human Security in Africa: Charting New Paths', (Provided by Global Crisis Solution (Brittany Kesselman <brittany@globalcrisissolutions.org>)).
- Mortimer, M. and Manvel, C. (2006), 'Climate change: enhancing adaptive capacity', *Natural Resources Systems Program Briefing Note*.
- Mukamuri, B.B., Campbell, B.M., and Kowero, G. (2003), 'Local organisations and natural resource management in the face of economic hardships: A case study from Zimbabwe', in Godwin Kowero, Bruce M. Campbell, and Ussif Rashid Sumaila (eds.), *Policies and Governance Structures in Woodlands of Southern Africa* (Jakarta: Center for International Forestry Research).

- Nhemachena, Charles (2010), 'Economic Impacts of Climate Change on Agriculture and Implications for Food Security in Southern Africa', *Climate Change and Security*, the 250th Anniversary Conference organized for The Royal Norwegian Society of Sciences and Letters (Trondheim, Norway).
- Nkala, Oscar (2010), 'War Vets Threaten to Uproot Nkomo Statue', *The Zimbabwe Mail*, 26 August.
- Nordas, Ragnhild and Gleditsch, Nils Petter (2007), 'Climate change and conflict', *Political Geography*, 26 (6), 627-38.
- Nordhaus, W (2006), 'Geography and Macroeconomics: New Data and Findings', *Proceedings of the National Academy of Sciences*, 103, 3510-17.
- Nyoni, Mike (2008), 'Bulawayo Faces Water Crisis', *IWPR Institute for War & Peace Reporting*, 14 April.
- Ohlson, Thomas (1998), *Power Politics and Peace Policies. Intra-State Conflict Resolution in Southern Africa* (Uppsala: Uppsala University) 1-199.
- Ohlson, Thomas (2008), 'Understanding Causes of War and Peace', *European Journal of International Relations*, 14 (1), 133-60.
- Osbahr, Henny, et al. (2008), 'Effective livelihood adaptation to climate change disturbance: Scale dimensions of practice in Mozambique', *Geoforum*, 39 (6), 1951-64.
- Pall, Pardeep, et al. (2011), 'Anthropogenic greenhouse gas contribution to flood risk in England and Wales in autumn 2000', *Nature*, 470 (7334), 382-85.
- Palma, Cheryl A., et al. (2010), 'Identifying potential synergies and trade-offs for meeting food security and climate change objectives in sub-Saharan Africa', *Proceedings of the National Academy of Sciences*, 107 (28).
- Pascual, M., et al. (2006), 'Malaria resurgence in the East African highlands: temperature trends revisited', (*National Acad Sciences*).
- Pinstrup-Andersen, P., Pandya-Lorch, R., and Babu, S. (1997), 'A 2020 vision for food, agriculture, and the environments in southern Africa', in L. Haddad (ed.), *Achieving Food Security in Southern Africa* (Washington, DC: IFPRI).
- Raath, Jan (1992), 'People stampede for food as drought and shortages cause violence', *The Times*, 2 April.
- Raleigh, C, Jordan, L, and Salehyan, I (2008), 'Assessing the impact of climate change on migration and conflict', (Washington: Social Development - The World Bank).
- Raleigh, Clionadh and Kniveton, Dominic (2010), 'Chronic Cummonal Conflict and Environmental Pressures', *Climate Change and Security*, the 250th Anniversary Conference organized for The Royal Norwegian Society of Sciences and Letters (Trondheim, Norway).
- Randell, Vicky and Svasand, Lars (2002), 'Political Parties and Democratic Consolidation in Africa', *Democratization*, 9 (3), 30-52.
- Ranger, Terrence (2004), 'Nationalist Historiography, Patriotic History and the Hstory of the Nation: the struggle over the Past in Zimbabwe', *Journal of Southern African Studies*, 30 (2).
- Reno, William (2000), 'Shadow States and the Political Economy of Civil Wars', in Mats Berdal and David M. Malone (eds.), *Greed and Grievance. Economic Agendas in Civil Wars* (Boulder and London: Lynne Rienner Publishers), 43-68.
- Sachs, JD and Warner, A (1997), 'Sources of Slow Growth in African Economies', *Journal of African Economies*, 6, 335-76.
- SADC (2002), 'Annual Report 2001-2002', (Southern Africa Development Community).

- Salehyan, Idean (2005), 'Refugees, Climate Change, and Instability', *Human Security and Climate Change. An International Workshop* (Asker, Norway).
- Salehyan, Idean (2008), 'From Climate Change to Conflict? No Consensus Yet', *Journal of Peace Research*, 45 (3), 315-26.
- Salehyan, Idean and Gleditsch, Kristian (2004), 'Refugee Flows and the Spread of Civil War', (San Diego: Department of Political Science, University of California).
- Salih, Mohamed (2007), 'Political parties in Africa: challenges for sustained multiparty democracy: Africa regional report based on research and dialogue with political parties', (Stockholm: International Institute for Democracy and Electoral Assistance).
- Sambanis, Nicholas (2001), 'Do Ethnic and Nonethnic Civil Wars Have the Same Causes: A Theoretical and Empirical Inquiry (Part 1)', *Journal of Conflict Resolution*, 45 (3), 259-82.
- Saunders, Christopher (2010), 'Zimbabwe: Recent History', in Routledge (ed.), *Europa Regional Surveys of the World: Africa South of the Sahara 2011* (London & New York: Routledge).
- Schafer, Jessica (2001), 'Guerillas and Violence in the War in Mozambique: De-Socialization or Re-Socialization?', *African Affairs*, 100, 215-37.
- Schafer, Jessica (2007), *Soldiers at Peace: Veterans and Society after the Civil War in Mozambique* (New York & Basingstoke: Palgrave MacMillan).
- Short, K.E. and Edmeades, G.O. (1991), 'Maize improvement for water and nitrogen deficient environment', in J.F. MacRobert (ed.), *Proceedings of the Crop Science Society of Zimbabwe Twenty First Anniversary Crop Production Congress* (Harare, Zimbabwe).
- Simms, Andrew (2005), 'Africa - Up in Smoke? The second report from the Working Group on Climate Change and Development', (London: International Institute for Environment and Development).
- Smith, Alex Duval (2001), 'Zimbabwe Police on Alert after Rioting in Bulawayo', *The Independent*, 18 November.
- Söderberg Kovacs, Mimmi (2007), 'From Rebellion to Politics: The Transformation of Rebel Groups to Political Parties in Civil War Peace Processes', (Uppsala University).
- Stedman, Stephen John (1997), 'Spoiler Problems in Peace Processes', *International Security*, 22 (2), 5-53.
- Sumich, Jason and Honwana, João (2007), 'Strong Party, Weak State? FRELIMO and State Survival Through the Mozambican Civil War: An Analytical Narrative on State-Making', (London: Crisis States Research Centre).
- Swain, Ashok (1993), *Environment and conflict: analysing the developing world* (Uppsala: Uppsala Universitet).
- (1996a), 'Water Scarcity: A Threat to Global Security', *Environment & Security*, 1 (1), 156-72.
- (1996b), 'Environmental Migration and Conflict Dynamics: Focus on Developing Regions', *Third World Quarterly*, 17 (5), 959-73.
- (1996c), 'Displacing the Conflict: Environmental Destruction in Bangladesh and Ethnic Conflict in India', *Journal of Peace Research*, 33 (2), 189-204.
- Swain, Ashok (2004), *Managing Water Conflict: Asia, Africa and the Middle East* (London: Routledge).
- Swain, Ashok (forthcoming 2011a), 'Challenges for Water Sharing in the Nile Basin: Changing Geo-Politics and Changing Climate', *Hydrological Science Journal*.

- Swain, Ashok (forthcoming 2011b), 'Global Climate Change and Challenges for International River Agreements', *International Journal on Sustainable Society*.
- Tajfel, Henri (1974), 'Social Identity and Intergroup Behavior', *Social Science Information*, 13 (2), 65-93.
- Tanser, F.C., Sharp, B., and le Sueur, D. (2003), 'Potential effect of climate change on malaria transmission in Africa', *Lancet*, 362, 1792-98.
- Theisen, Ole Magnus (2010), 'Scarcity and Organized Violence in Kenya, 1989-2004. A 'Fitting' or a 'Mis-Fitting' Case of Environmental Security Theory?', *Climate Change and Security*, the 250th Anniversary Conference organized for The Royal Norwegian Society of Sciences and Letters (Trondheim, Norway).
- Themner, Anders (forthcoming 2011), *Violence in Post-Conflict Societies: Remarginalisation, Remobilisers and Relationships* (New York & London: Routledge).
- Thompson, C.B. (1993), 'Drought Management Strategies in Southern Africa: From Relief through Rehabilitation to Vulnerability Reduction', (Windhoek, Namibia: UNICEF Policy Monitoring Unit).
- Tilly, Charles (1978), *From Mobilization to Revolution* (New York: Random House).
- Trenberth, Kevin E., et al. (2003), 'The Changing Character of Precipitation', *Bulletin of the American Meteorological Society*, 84 (9), 1205-17.
- Twomlow, S., et al. (2008), 'Building adaptive capacity to cope with increasing vulnerability due to climatic change in Africa – A new approach', *Physics and Chemistry of the Earth*, 33, 780-87.
- UNDP (2004), 'Meeting the Climate Challenge Sustaining Livelihoods: Lessons for the Future', (United Nations Development Programme and Global Environmental Facility).
- UNEP/GRIDA (2011), 'Climate change in Zimbabwe: trends in temperature and rainfall', <http://maps.grida.no/go/graphic/climate_change_in_zimbabwe_trends_in_temperature_and_rainfall>, accessed 3 February.
- UNESCO World Heritage Centre (2010), 'Zambezi Source', <<http://whc.unesco.org/en/tentativelists/5427/>>, accessed 7 February
- UNFCCC 'The United Nations Framework Convention on Climate Change', <http://unfccc.int/essential_background/convention/background/items/1349.php>.
- UNFCCC (2003), 'Mozambique's Initial National Communication to the UNFCCC', (Ministry for Co-Ordination of Environmental Affairs – MICOA).
- UNFCCC (2007), 'Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries', (Bonn: Climate Change Secretariat, UNFCCC).
- USDA (2009), 'Satellite Imagery Indicates 2009 Corn Area in Zimbabwe is less than corn area in 2000, Commodity Intelligence Report', (Foreign Agriculture Services, US Department of Agriculture).
- Van Rooyen, J. and Sigwele, H. (1998), 'Towards regional food security in southern Africa: a (new) policy framework for the agricultural sector', *Food Policy*, 23 (6), 491-504.
- Varshney, Ashutosh (2002), *Ethnic Conflict and Civil Life* (New Haven: Yale University Press).
- Wallensteen, Peter and Swain, Ashok (1997), 'Environment, Conflict and Cooperation', in D Brune, et al. (eds.), *The Global Environment. Science, Technology and Management* (2; Weinheim: VCH Verlagsgemeinschaft mbH), 691-704.

- WFP (2003), 'Full Report of the Real-Time Evaluation of WFP's Response to the Southern Africa Crisis, 2002-2003', (Rome: World Food Program).
- WHO (2010), 'UN-Water Global Annual Assessment of Sanitation and Drinking-Water (GLAAS)', (Geneva: World Health Organisation).
- World Resources Institute (2011), 'Watersheds of the World: Africa - Zambezi Watershed', EarthTrends: The Environmental Information Portal <http://earth-trends.wri.org/pdf_library/maps/p2_34.pdf> accessed 3 February.
- ZAPU (1981a), 'Zimbabwe between the lines. Issue No. 1', in Zimbabwe African Peoples Union (ed.), (Oxford: Anti-Apartheid Movement Archive. MSS AAM 1225).
- ZAPU (1981b), 'Zimbabwe between the lines. Issue No. 2', in Zimbabwe African Peoples Union (ed.), (Oxford: Anti-Apartheid Movement Archive. MSS AAM 1225).
- Zartman, William I. (ed.), (1995), *Elusive Peace: Negotiating an End to Civil Wars* (Washington D.C.: The Brookings Institution).

