The Impact of Climate Change on Human Security in the Zambezi River Basin

A pre-study with a focus on Chinde District in Mozambique and Bulawayo in Zimbabwe

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Cover photo: Odd Andersen, AFP, Scanpix

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Sammanfattning

Den här studien syftar till för att öka förståelsen av hur mänsklig säkerhet påverkas av klimatförändringar i två områden i Zambezi River Basin i södra Afrika. De två områdena är Chinde-distriktet i Mocambique och staden Bulawayo i Zimbabwe. I en tidigare studie, som har gjorts inom forskningsprogrammet *Climate Change, Natural Resource Governance, and Conflict Prevention in Africa* av Swain m fl (2011), har just dessa områden pekats ut som särskilt utsatta för klimatrelaterade konflikter. Detta eftersom de förväntas drabbas hårt av klimatförändringar samtidigt som de lider av ett svagt samhällsstyre. Den här studien är en fortsättning på den tidigare studien och fokuserar på den lokala nivån i syfte att ligga till grund för ett fortsatt anpassningsarbete.

Idag utsätts regionen runt Zambezi River av såväl översvämningar som långa torrperioder. Längs kusterna är det vanligt förekommande med cykloner. Varje år påverkas hundratusentals människor av extrema väderhändelser som leder till dödsfall, förlust av egendom, migration, svält, epidemier och miljöförstöring. Människorna som bor i regionen är beroende av floden för dricksvatten, transporter och bevattning av jordbruk och är därför sårbara för de förändringar i vattencykeln som klimatförändringarna kommer att föra med sig.

Klimatförändringarna kan därför ses som ett av de stora hoten mot mänsklig säkerhet. Det finns en stor risk att de förvärrar existerande och latenta spänningar som finns i de redan politiskt instabila områdena. Klimatförändringarna brukar beaktas som en förstärkande faktor (’threat multiplier’) som ökar risken för osäkerhet och konflikter. Ett sätt att möta effekterna av klimatförändringarna är att anpassa samhället genom olika anpassningsåtgärder (’threat minimisers’).

Historiskt sett är säkerhetsbegreppet associerat med förmågan hos en stat eller regim att upprätthålla territoriell säkerhet. Begreppet mänsklig säkerhet introducerades under tidigt 1990-tal av UNDP som ett alternativ till det dominerande statscentrerade perspektivet på säkerhet. Mänsklig säkerhet innebär att människor har tillgång till en god miljö, en tillförlitlig inkomst, tillräckligt med mat och vatten, har en god hälsa och möjlighet att utnyttja hälsovård, samt

ha mänskliga rättigheter och känna sig säkra från övergrepp. Den här studien analyserar vilka effekter klimatförändringar har på olika kategorier av mänsklig säkerhet i de två valda områdena med fokus på miljö, ekonomi, mat och hälsa.

I studien har vi valt att använda ett perspektiv som benämns ’starting-point vulnerability’ när vi analyser sårbarheter mot klimatförändringarna. Det innebär att man genom att studera sårbarheter mot dagens klimat ökar förståelsen för hur framtida sårbarheter till följd av klimatförändringarna kommer att utvecklas. Som en konsekvens av det valet har vi inte använt klimatscenarier för en viss tidpunkt utan enbart betraktat klimatförändringarna som trender.

I rapporten diskuterar vi hur effekterna av klimatförändringarna påverkar mänsklig säkerhet i de två utpekade områdena. Tillgången till en säker miljö påverkas av klimatförändringarnas effekter på våtmarker och skogar, förlusten av biologisk mångfald samt kvaliteten, såväl som kvantiteten, av vattentillgångar. I Chinde kan saltvattenintrång i floddeltat bli ett problem och i Bulawayo kommer klimatförändringarna att anstränga de redan knappa vattenresurserna.

Den ekonomiska säkerheten i de båda områdena förväntas försämras, bland annat som en konsekvens av en lägre energiproduktion när vattentillgången blir mer oförutsägbar i framtiden. Flera inkomstkällor i regionen, som handel i Chinde och urbant jordbruk i Bulawayo, kommer att påverkas direkt eller indirekt av klimatförändringarna. Det finns också en risk för att de lokala priserna höjs när tillgången på livsmedel minskar till följd av torka och översvämningar.

Matsäkerheten kommer att förvärras eftersom jordbruket påverkas negativt av klimatförändringarna. I Chinde kommer även fisket påverkas. Transporter av livsmedel påverkas om infrastrukturen förstörs av extrema väderhändelser som häftiga skyfall och cykloner. Höga lokala matpriser till följd av torka gör att färre människor har råd att köpa den mat de behöver och i Bulawayo kommer tillgången på rent vatten försämras ytterligare.

Hälsosäkerheten kommer bland annat att påverkas av en ökning av sjukdomar till följd av klimatförändringarna. I Chinde är vektorburna sjukdomar det största hotet och i Bulawayo förväntas vattenburna sjukdomar öka till följd av en minskad tillgång till rent vatten i kombination med dåliga sanitära förhållanden. Den redan otillräckliga hälsovården kommer att utsättas för påfrestningar och människor kommer också att ha svårare att ta sig till de hälsoinrättningar som finns om infrastrukturen försämras till följd av extrema väderhändelser.

Swain m fl (2011) har i sin rapport diskuterat *varför* de två områdena Chinde och Bulawayo är sårbara och presenterat tre förklaringsfaktorer: (1) dåliga ledare, (2) svaga institutioner och (3) polariserade sociala identiteter. I den här rapporten diskuterar vi *hur* de ovan redovisade effekterna av klimatförändringar på mänsklig säkerhet i Chinde och Bulawayo kan öka risken för motsättningar och konflikter. Analysen visar på tre, icke-uttömmande, möjliga spänningar som kan resultera i konflikter på olika nivåer om de förstärks av klimatförändringar: a) okoordinerad hantering av migrationsflöden, b) politisering av tillgång till

service och resurser, och c) repressivare åtgärder från regeringar för att behålla makten allt eftersom deras utrymme att köpa stöd genom resursfördelning begränsas och ifrågasätts tydligare i och med att resursknappheten tilltar.

Genom ett mänsklig säkerhet-perspektiv underlättas en tidig upptäckt av upptrappningar av hot på regional och lokal nivå som kan övergå till konflikter. Fokus på mänsklig säkerhet kan därför användas för att identifiera behovet av anpassningsåtgärder och early warning-system. Som komplement till traditionella early-warning system finns det behov av att utveckla indikatorer som kan detektera spänningar till följd av en försämrad ekonomisk situation, försämrad tillgång till mat och vatten samt försämrade möjligheter att upprätthålla hälsan för den enskilde. Resultaten av den här studien, som baseras på en analys på lokal nivå, kan utgöra basen för ett sådant arbete.

Nyckelord: Sårbarhet, klimatförändringar, mänsklig säkerhet, konflikter, Zambezi River Basin, Södra Afrika, Zimbabwe, Mocambique

Summary

This study aims to deepen the understanding of the vulnerability of human security to climate change in two areas in the Zambezi River Basin, chinde District of Mozambique and Bulawayo in Zimbabwe. In a preceding study by Swain et al. within the same overall programme (*Climate Change, Natural Resource Governance, and Conflict Prevention in Africa*), these areas have been identified as most likely to experience climate-induced conflicts in the near future since they are expected to be severely impacted by climate change and suffer from poor quality of political governance. As the next step in the programme, this study is focused on these areas since it enables an analysis at the local level, which is critical for addressing the challenges faced, and allows the comparison between two different contexts.

Climate variations have throughout time affected people's living conditions in these areas. At present, the Zambezi River Basin suffers from floods, droughts and, in the coastal areas, cyclones. Each year hundreds of thousands of people in the area are affected by climate disasters resulting in the loss of lives and assets. Other consequences are displacement of people, starvation, epidemics, environmental degradation and animal attacks. People living in the Basin are dependent on the river as a vital source of drinking water, agricultural irrigation and transportation, and are therefore vulnerable to the changes in the water cycle that will be a consequence of climate change.

Climate change can also be seen as a major threat to human security, exacerbating existing or latent tensions in already instable areas. Climate change is for that reason often considered a threat multiplier that increases the risk of insecurity and conflict. Interest and resources are therefore directed towards measures to adapt to climate change in order to reduce its negative impacts, and to capture the potential positive impacts.

Historically, security has been associated with capabilities within the state or regime to uphold territorial security. The concept of human security emerged in the early 1990's within the United Nations Development Programme as an

alternative to the traditional state-centred perspective. Human security implies that humans have access to an income, water and food in sufficient amounts, access to health service, a decent environment and are able to feel safe and live a tolerable life. This study provides an analysis of the potential impact from climate change on different categories of human security, with a focus on environmental, economic, food and health security.

When studying vulnerabilities to climate change, there are various approaches to be used. In this study we have chosen the perspective of 'starting-point vulnerability', which means a focus on *current* vulnerabilities to climate and climate variability. Taking today's vulnerability as a starting point hopefully gives an understanding of how future vulnerabilities to climate change can be reduced. Due to this choice, future climate change is mainly treated as trends without any specific scenarios or time horizons.

The potential impacts of climate change on human security are discussed in the two case study areas. Environmental security will be affected by climate change through impacts on wetland and forests, loss of biodiversity, and the quantity as well as quality of water. In the Chinde district saltwater intrusion in the delta will be a problem and in Bulawayo, climate change will put further stress on the already insecure environment, most notably as water resources become scarcer.

Due to climate hazards, the economic security is expected to be lowered in both areas by, e.g., a reduced industrial production following an increased uncertainty in energy supply and potential damages on vital infrastructure. Several income sources in the Basin, such as trade in Chinde District and urban agriculture in Bulawayo will be affected by climate change. There is also a risk of increased local prices when food becomes scarce as a consequence of natural disasters.

Food security could be reduced due to a decreased agricultural production, and in the Chinde district, also due to less fishing opportunities. Access to food is affected by e.g. loss of infrastructure and by higher food prices. Utilization of food, which is negatively affected by poor nutrition and health, will be more challenging primarily due to scarcity of fresh water which already is a large problem today in Bulawayo.

Health security, finally, will be affected through threats to human health, in the form of e.g. vector-borne diseases in the Chinde district and outbreaks of waterborne diseases in Bulawayo due to reduced access to water and insufficient sanitation. The already insufficient health care system will be even more strained by, among other reasons, a decreased supply of safe water and infrastructure damages.

Given the identified impact on human security outlined above, the possible lines of tension that may trigger conflicts are analysed and discussed. While the framework of Swain et al. explains *why* vulnerability is prevailing by three explanatory factors: (1) bad leaders, (2) weak institutions and (3) polarized social identities, this study aims at explaining *how* these vulnerabilities and challenges

to human security operate in relation to conflict. This analysis shows three, non-exhaustive, possible lines of tension that could result in conflicts at different levels: a) uncoordinated management of migration flows; b) politicisation of access to services and resources; and c) an increasing repressiveness of government responses as its patronage systems of control are both undermined and further questioned as resources become scarcer.

A perspective on human security and its mechanisms can facilitate efforts to detect threats of regional and local escalation and transition into conflict as well as describing threats to individuals at an early stage. In this sense, exploring aspects of deteriorating human security could provide a good starting point for identifying the need for adaptation measures and early-warning systems. In addition to traditional conflict early-warning systems, there is a need to develop indicators that register lines of tension connected to a decline in economic, food, health and environmental security. This study, based on a local level analysis, may be a foundation for such work.

Keywords: Vulnerability, Climate Change, Human Security, Conflicts, Zambezi River Basin, Southern Africa, Mozambique, Zimbabwe

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Foreword

This report was written within the programme *Climate Change, Natural Resource Governance and Conflict Prevention in Africa*. The programme is run by Global Crisis Solutions (GCS), Uppsala University, and the Swedish Defence Research Agency (FOI) and is financed by the Swedish International Development Cooperation Agency (Sida). The views expressed are those of the authors and do not necessarily express the views of Sida.

The overall objective of the programme is to contribute to the prevention and resolution of conflicts related to climate change and natural resource governance in Africa, with a focus on water management. This includes enhancing the knowledge-base and improving early warning in relation to natural resource- or climate-related conflicts, and to enhance the capacity for early response to prevent such conflicts, particularly in identified flashpoint areas.

The aim of the study presented in this report is to improve the understanding of local societies' vulnerability to climate change and how these vulnerabilities may exacerbate lines of tensions in two areas in the Zambezi River Basin – Chinde District of Mozambique and Bulawayo in Zimbabwe.

These areas have been identified in an initial study within the programme, *Climate Change and the Risk of Violent Conflicts in Southern Africa,* performed by Uppsala University, as specifically vulnerable to climate change and at the same time suffering from poor governance. The programme also includes case studies to be undertaken in these areas. This report is intended as a foundation for further work engaging in early warning.

The focus of the study is on human security. By taking the individual as the basic unit of analysis, it is easier to fulfil the programme's overall aim – to be proactive and to contribute to the prevention of conflicts. The study is meant to be a link between the scoping study performed initially, which describes the regional level, and the advocacy element, which will be carried out by GCS working with civil society organisations at the local level.

In preparing this report we received input from a number of people. We would especially thank Justin MacDermott, Malin Mobjörk and Bengt Johansson for their fruitful comments and assistance.

1 Introduction

Climate variations have throughout time affected people's living conditions. Droughts, storms and flooding have posed a threat to the well-being or even survival of many people. It is now clear that anthropogenic emissions of greenhouse gases have led to climate change, a change that is expected to continue during coming decades even if mitigation efforts are getting implemented in response to the problem.[1] Climate change is by many seen as a major threat to human security and is assumed to add risk of violent conflict, especially in already instable areas.[2] More interest and resources are therefore directed towards measures to adapt to climate change in order to reduce the negative impacts of climate change and capture the potential positive impacts.

Africa is often highlighted as a geographical area where the impact of climate change is assumed to be especially severe.[3] The reason for this is a combination of significant climate change, societies' vulnerabilities to climate change and a low adaptive capacity.

The aim of this study is to improve the understanding of local societies' vulnerability to climate change and how these vulnerabilities may exacerbate lines of tensions on a local level. Two areas in the Zambezi River Basin, Chinde District of Mozambique and Bulawayo in Zimbabwe, have been chosen as case studies. These areas are situated in two regions in southern Africa that have been identified as the most likely to experience climate-induced conflicts in the near future, the Zambezia Province in Mozambique and Bulawayo/ Matabeleland-North in Zimbabwe.[4] The regions have been identified because:[5]

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 coastal erosion in the Zambezia Province.

b) Climate change and climate variability will make agricultural production in the two regions highly volatile, leading to severe food insecurity.

c) Both regions are suffering from a context of poor governance, with unscrupulous elites, weak institutions and polarised social identities.[6]

The reason to focus this study on two smaller areas in the two regions mentioned above is to enable an analysis at the local level and to present two different

[1] IPCC (2007a)
[2] See for example World Bank (2011b) and UN Secretary-General Report (2009)
[3] IPCC (2007b)
[4] Swain et al. (2011)
[5] Ibid. p. 11
[6] Ibid. p. 11

contexts in which climate change may have an impact. The local level is important since adaptation measures primarily have to be taken by local people familiar with the local context.

The study is based on a variety of sources such as scientific papers, policy reports and statistics, presenting relevant information about factors contributing to the vulnerabilities to climate change. When access to specific information for the studied areas is limited, information has also been sought on the national level aiming to describe the more general situation in Mozambique and Zimbabwe.

The information is analysed from a human security perspective (see section 2.1 for a more thorough discussion and the motivation for this approach). This means choosing the individuals and communities as the focal point for the security discussion in contrast to the state. Human security also includes a broader sense of human well-being rather than only risk of conflicts or violence induced by climate change.

Various approaches to understand vulnerabilities to climate change are discussed in section 2.2. In this study we choose a perspective often called 'starting-point vulnerability'. This entails a focus on current vulnerabilities to climate and climate variability, taking these as a starting point in the process of understanding how future vulnerabilities to climate change can be reduced. Future climate change is mainly treated as trends without any specific scenarios or time horizons.

Chapter 3 describes the Zambezi River Basin and the two case study areas; the Chinde district in Mozambique and Bulawayo in Zimbabwe. This chapter acts as a background for the analysis in chapters 4 and 5. Chapter 4 describes how climate change may impact on human security in the chosen areas. The different categories of human security, as defined by UNDP[7], are described and the potential impacts of climate change on each category in the Chinde District and in Bulawayo are discussed. In chapter 5, the connections between climate change, human insecurity and possible conflicts are discussed in the two case areas. Finally, chapter 6 presents a concluding discussion, linking the findings of the report to the overall programme objectives.

[7] UNDP (1994)

2 Analytical framework

2.1 Security perspectives

The connection between climate change and security has been pointed out by several organisations.[8] The impacts of climate stresses on society, such as water scarcity and sea level rise, may lead to insecurity which, through a multitude of mechanisms, may evolve into conflicts. Climate change may lead to a decline as well as an increase in resources and also influence the capability to access them.[9] Climate change hence highlights distribution of the available resources and the institutional capacity of affected states to protect those who lack such access.

A decline in the capacity of the state to provide for basic needs in water, food, livelihood and public health increases fragility and decreases the societal capability to disarm other lines of tension from transforming into conflict. Climate change is therefore an enhancer or "threat multiplier" of existing tensions, often through impacts on human security, which is further discussed below.

2.1.1 Climate change as conflict multiplier

Conflict is often caused by a combination of security, economic and justice stresses. These stresses to a state can be internal, such as low income levels or high levels of inequality, or external, for example, global economic shocks or climate change. The impact of such stresses is highly context-dependent. However, weak institutions and weak governance generally undermine a state's resilience to insecurity, increasing the risk of instability and tensions.[10] The impacts of climate change risk disrupting patterns of daily life as well as increasing chronic threats through the possible escalation of levels of poverty, hunger and disease.[11]

Mobjörk et al. argue that there are no direct causal links between climate change and armed conflicts.[12] There is, on the other hand, a correlation between poverty, dysfunctional institutions and the probability of a society's transition from tension into armed conflict. This is due to the weaker coping mechanisms of such societies.[13] Climate change is thus an external factor that can exacerbate existing or latent tensions, through its challenges to human security, and is often

[8] See, e.g. World Bank (2011b), UN Secretary-General Report (2009) and Schubert et al. (2007)
[9] Mobjörk et al. (2010), p. 67
[10] World Bank (2011b), pp. 6–7
[11] UNDP (1994), p. 23
[12] Mobjörk et al. (2010), p. 77
[13] Duffield (2001), p. 21

considered to be a threat multiplier that increases the risk of insecurity and conflict.[14]

It is also known that climate change could aggravate resource scarcity in certain countries. Climate change affects livelihoods and aggravates an individual's insecurity by making access to food, water and health care, for example, more uncertain.

> [C]limate change can act as a catalyst deteriorating livelihoods, shifting population patterns and causing unequal distribution of resources. In this way climate changes exacerbates existing tension, creates new ones and may under certain circumstances lead to armed conflict.[15]

Issues of human security can be approached as possible triggers of transition and paths into conflict. A transition that itself deepens and enhances its roots in lack of human security.[16] Strategic perspectives on human security have in recent military debate therefore expanded into the sphere of geopolitical issues and regional security.[17] Hence a perspective on human security and its mechanisms can aid efforts to detect threats of regional and local escalation and transition into conflict as well as describing threats to individuals and communities. In this sense, exploring aspects of deteriorating human security could provide a good starting point when studying the link between climate change and conflicts.

2.1.2 Threat multipliers and minimisers

The United Nations General Assembly has described five different channels through which climate change can exacerbate existing sources of conflict and insecurity (see Figure 1).

[14] UN Secretary General report (2009) pp. 6–8; and World Bank (2011b), p. 7
[15] Maas et al. (2010), p. 2
[16] Duffield (2001), p.124
[17] Swain et al. (2011), p.18

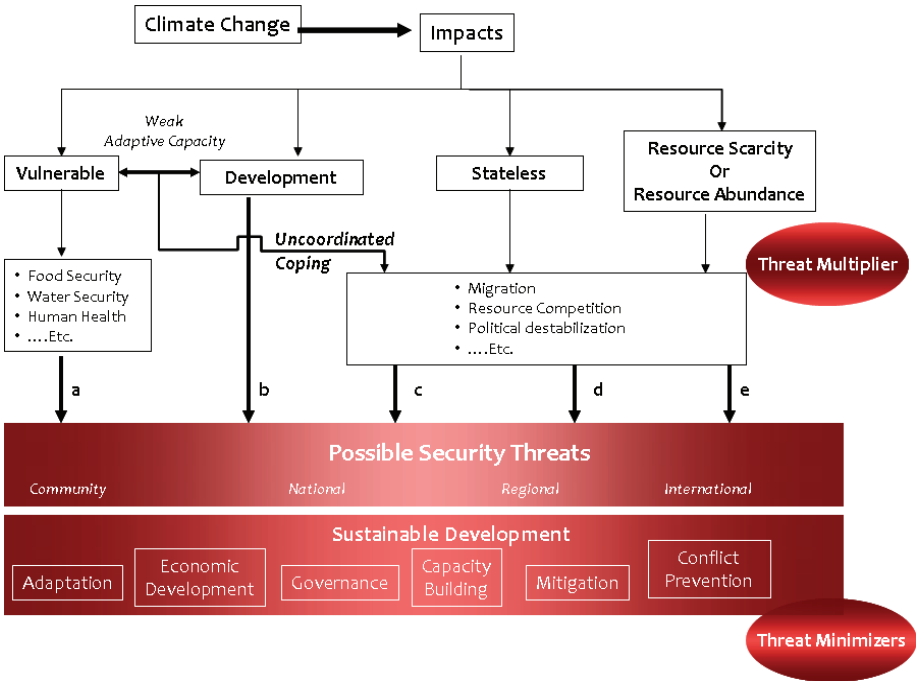

Figure 1. Climate Change Impact on Security through Five Channels. *Source*: United Nations General Assembly Report (2009), p.7.

The first channel (the left part of Figure 1) shows that the climate change will affect security by making communities more vulnerable through impacts on a range of human rights such as right to life, health, food, water and housing.[18] Vulnerability of the individual is intimately linked to human security. Human security can be seen as the capacity to overcome vulnerability.[19] All measures that aim to strengthen human security can therefore be seen as measures to decrease the risk of conflicts. The UN-model argues that the best way of doing that is by *adaptation*, which is seen as a threat minimiser.

The second and third channels run from impacts of climate change to threats on the national level through weak adaptive capacity and through low development. Weak adaptive capacity includes involuntary migration, competition with other communities or groups over scarce resources, and overburdening of local or national governance capacities. In order to decrease the security threat, adaptive capacity and development must be strengthened by *economic development* and *strong governance* and *capacity building*.[20]

[18] UN Secretary General report (2009), p. 7
[19] Brklacich et al. (2010), p. 37
[20] UN Secretary General report (2009), p. 8

The fourth and fifth channels describe the effects on regional and international levels, where climate change may put stress on the viability of sovereign states, by for example sea-level rise and loss of national territory, and on resource scarcity and abundance that may lead to territorial disputes. Threat minimisers in these cases are suggested to be *mitigation* and *conflict prevention*.

To summarise, the suggested threat minimisers that can be applied in the UN-model to strengthen human security are adaptation, economic development, governance and capacity building. Adaptation aims to make people more secure through foremost social and economic development. By doing this, people become empowered, more resilient to exposures and better capable of responding to the impacts of climate hazards. Although such adaption foremost targets households and communities, efforts by local, national and international actors are needed.

More specifically, such efforts entail securing livelihoods; strengthening infrastructure to withstand extreme weather; and strengthening institutions and systems needed to cope with the consequences. Sustainable economic growth is essential to build up resilience and ensure that developing countries are adequately equipped to adapt to climate change. Institutions are needed in order for the government to respond effectively to people's needs in the face of disaster. Political legitimacy is otherwise at risk and political instability an impending possibility.[21]

The consequences of climate change for security are, however, highly context-dependent. The magnitude of the exposure to climate change combined with the levels of community, national, regional and international coping capacity will determine the impact on security.[22]

Research on climate change and conflicts highlights a relationship between rapid climate changes and conflicts. Abrupt physical alterations, such as climate hazards, are regarded as more important to climate security than gradual climate processes.[23] Mazo argues that in the medium term, the increased variability of climate variables, especially the increased frequency and severity of extreme events, will be the most significant contributor to insecurity.[24]

2.1.3 The human security perspective

Historically, security has been associated with abilities with the state or regime to uphold territorial security. Traditional security therefore targets threats against sovereignty, territory, state institutions and policy. As an alternative to the

[21] UN Secretary Genreal report (2009), pp. 26, 28
[22] Raleigh, Clionadh (2010), p. 73.
[23] Mobjörk et al. (2010)
[24] Mazo (2010), p. 140

traditional state-centred perspective, the concept of *human security* emerged in the early 1990s. The United Nations Development Programme (UNDP) articulated the concept in its 1994 Human Development Report. It is an individual- and community-centred approach to security in contrast to security solely within and between states.[25] Human Security is often described as freedom from fear and freedom from want. As such the concept implies that humans have access to an income, water and food in sufficient amounts, have access to health service, a decent environment, are protected from political repression and social conflict and thereby are able to feel safe and live a tolerable life. Compared to traditional security perspectives, human security analysis must consequently utilise other variables when approaching insecurity.

There are many definitions of Human Security, but the most used definition is that introduced by UNDP in 1994:

> Human security can be said to have two main aspects. It means, first, safety from such chronic threats as hunger, disease and repression. And second, it means protection from sudden and hurtful disruptions in the patterns of daily life-whether in homes, in jobs or in communities. Such threats can exist at all levels of national income and development. The loss of human security can be a slow, silent process. Or an abrupt, loud emergency. It can be human-made due to wrong policy choices. It can stem from the forces of nature. Or it can be a combination of both – as is often the case when environmental degradation leads to a natural disaster, followed by human tragedy. [26]

However, human security is not an approach entirely separated from traditional security. Human security is an attempt to widen security into to including contexts where distress and harm is present, and furthermore not limiting the analysis to situations where there is an actual on-going armed conflict. Nevertheless, traditional security and human security are interlinked as human security often depends on a well-functioning government.[27] The opposite is also valid; traditional security can be threatened if the level of human security decreases.

Human security is context-based and its features vary between states and regions, depending on the specific local challenges to the people's security. UNDP has defined seven different categories of human security; environment, economic, food, health, personal, community and political security.[28] The different categories, which are discussed more in detail below, overlap to some extent. Human security puts a large emphasis on hazards directly posed by

[25] UNDP (1994)
[26] Ibid. pp 23–24
[27] See e.g. Barnett and Adger (2007)
[28] UNDP (1994), p.5

environmental change, as opposed to traditional security that often focuses on antagonistic threats.

The usefulness of the concept of human security has been criticised because the boundary of its definition is indistinct and it overlaps with other concepts, such as human development, poverty and political instability. Instead, therefore, the World Bank has introduced a new concept, citizen security, which focuses more exclusively on freedom from physical violence and freedom from fear of violence. In its application of this concept, the World Bank summarises that when facing the risk of conflict and violence, the key elements of achieving human security are *citizen security*, *justice* and *jobs*.[29] Another criticism is that human security can play down other security risks, such as wars and the role of the nation state.[30]

Environmental security

Environmental security aims to protect the healthy physical environment that human beings rely on. Threats to environmental security include intensive industrialisation and rapid population growth, which may degrade ecosystems. A large environmental problem, and a challenge in developing countries, is water scarcity as a consequence of human pollution. Other problems include salinization that may threaten irrigated land and deforestation that may exacerbate the intensity of both droughts and floods. Many environmental threats are chronic and long-lasting, but others have a more sudden and violent character. Population growth, as well as poverty and land shortages, may also move people into areas that are prone to cyclones, earthquakes or floods and thereby increase their vulnerability.[31]

Climate change, including increased temperatures, changed pattern of precipitation, sea-level rise and an increased frequency of climate hazards, will further aggravate the environmental insecurity, which in turn will influence the economic, food and health security.

Economic security

According to UNDP, economic security refers to the asset of an assured basic income, whether from productive and remunerative work or publicly financed

[29] World Bank (2011b), p. 11
[30] Schubert et al. (2007), p. 20
[31] UNDP (1994), pp. 28-30

safety nets, in order to support a standard of living both now and in the foreseeable future.[32]

The factors that limit sufficient income, and therefore contribute to *economic insecurity*, are mainly unemployment or employment at a low salary, lack of access to land or a lack of the capacity to farm or invest effectively in profitable production, insufficient education and skills, high inflation and a consequent loss of real wages, and health problems and chronic diseases and disabilities. People in countries with high levels of economic insecurity are often in greater need of support from their governments. However, since such countries often suffer from grave budgetary problems, they lack the capacity to ensure a social safety net for their population. Instead, households in areas with high levels of economic insecurity are often highly dependent on income from the informal sector, and remittances and aid from abroad.[33]

Economic security can be divided into chronic poverty and sudden economic downturns. The latter are linked to economic and social crises or natural disasters.[34]

Food security

Food security, according to the World Food Summit, 'exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life'.[35]

Food security requires not only the production of sufficient food, but also that people have access to food by growing it themselves, buying it or taking advantage of a public food distribution system.[36]

Food availability refers to the need for sufficient quantities of food to be available of appropriate quality, supplied through domestic production, imports or food aid.[37] *Food access* takes this factor into account when referring to the need for adequate access to different resources, such as economic, legal, political and social entitlements, in order to access appropriate food for a nutritious diet. *Utilisation* refers to the need for an adequate diet, clean water, sanitation and health care to enable adequate use of the food, leading to a sufficient state of nutritional well-being.

[32] UNDP (1994), p. 25
[33] Ibid. pp. 25-26
[34] Outline of the report of the commission on human security, p. 2, www.humansecurity-chs.org, accessed 2011-03-10
[35] World Food Summit (1996)
[36] UNDP (1994), p. 27
[37] FAO (2006)

Food *insecurity* can be divided into two types, as there is a distinction between chronic food insecurity and transitory food insecurity. The first is associated with problems of continuing and structural poverty and low income levels, while the second involves periods of intensified pressure caused by natural disasters, economic collapse or conflicts.[38] Food security is closely linked to economic security.

Health security

Health security implies being secure from exposure to health threats, being capable of taking care of one's own health if needed, and proper access to health care and medical care. In the universal declaration of human rights, everyone is given the right to a standard of living adequate for satisfactory health and well-being. To achieve health security, an accessible and affordable basic health service for households is essential.[39]

Most aspects of health security, as well as an individual's health status, are weakened by poverty and inequality.[40] Poverty in turn tends to increase due to poor health status.[41] The health status is worse for poor households and poor countries. This is because the impacts of poverty, such as food insecurity and poor nutrition, reduce health status, along with the fact that poorer countries generally provide poorer public health care systems.[42]

Health security is linked to both economic and food security. Low incomes reduce access to health care systems. Reduced food intake can result in malnutrition, which reduces health status due to starvation or increased vulnerability to infections and diseases.

Personal security

Personal security is security from physical violence. Threats can take several forms: threats from the state (e.g. physical torture), threats from other states (e.g. war), threats from other groups of people (e.g. ethnic tension), threats from individuals or gangs (e.g. crime, street violence), threats directed against women (e.g. rape, domestic violence), threats against children based on their vulnerability and dependence (e.g. child abuse), and threats to self (e.g. suicide, drug use).[43]

[38] FAO (2006)
[39] Onjala et al. (2006), pp. 6, 34
[40] O'Brien and Leichenko (2007/2008), p. 10
[41] Onjala et al. (2006), p. 34
[42] O'Brien and Leichenko (2007/2008), p. 10
[43] UNDP (1994)

Community security

Community security is the security people gain from their membership of a group, a family, a community, an organisation, or a racial or ethnic group that can provide a cultural identity and a reassuring set of values. Traditional communities can also oppress groups of people, for example, by treating women or ethic groups particularly harshly.[44]

Political security

Political security means that people should be able to live in a society that honours human rights. Human rights violations are most frequent during periods of political unrest.[45]

Of the seven categories of human security identified by UNDP and described above, environmental security will be most directly influenced by climate change. Economic, food and health security will be affected either directly or by the change in environment security. These four categories and are therefore discussed more in detail in the report. Personal, community and political security are affected in a more indirect way, through chains of events that can be difficult to foresee and describe. These three categories will therefore be left out in favour of an analysis of possible lines of tension derived from climate change-induced human insecurity in chapter 5.

2.2 Climate change and vulnerability

Human security and vulnerability are intimately linked. Brklacich et. al. argues that human security and vulnerability occupy opposite ends of a common continuum, and that human security can be seen as the capacity to overcome vulnerability.[46] Human *vulnerability* can therefore be used as a synonym for human *insecurity*. Human vulnerability/insecurity in general is affected by a large number of factors on global, national and local levels, such as the global world economy, the local government effectiveness and existing local social networks. This report, however, will focus on vulnerability to *climate change*, which means it focus on the contribution of climate change to the existing vulnerability.

[44] UNDP (1994)
[45] Ibid.
[46] Brklacich et al. (2010), p. 37

2.2.1 Climate change

Climate change due to the emission of greenhouse gases is a challenge for the international community. The global mean temperature increased by 0.74 °C between 1906 and 2005, and it is expected to increase further, reaching between 2 and 6 degrees in 2100 depending on the success of the world's mitigation efforts.[47] Regardless how these efforts succeed, the climate will continue to change as a consequence of emissions to date and due to a response delay in the global meteorological system. It is therefore important that, as a supplement to mitigation, societies adapt in order to reduce their vulnerability to climate change impacts that cannot be avoided.

The effects of climate change can mainly be divided into two types. First, *mean values* of climate variables, for example, temperature, precipitation and sea levels, which will continually change. Second, *variations* in climate variables around these mean values which will also change, in both frequency and amplitude. These two effects together will result in an increased occurrence of extreme climate events such as droughts and flooding, as is illustrated in Figure 2. Climate hazards will also be more prolonged than today.

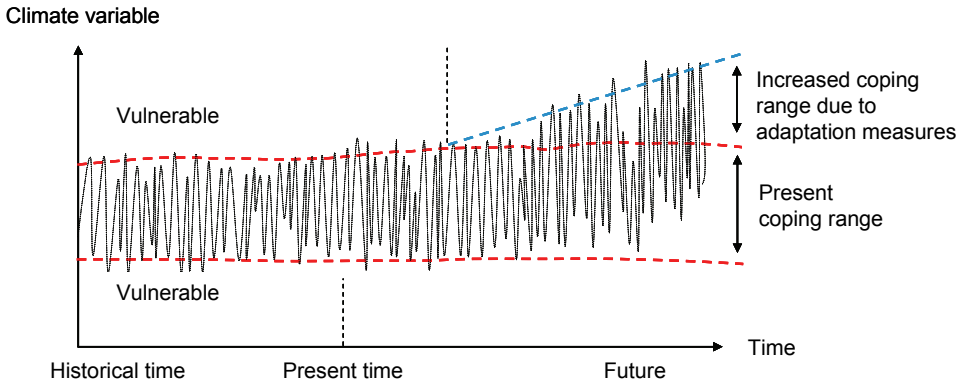

Figure 2 is a schematic picture of how the mean value and variation of a climate variable, for example temperature or sea level, can change over time due to climate change. The coping range of a society is marked by red lines, which demonstrate that both low and high values, for example for sea level, can make a society vulnerable. Future climate change may make it necessary to increase the coping range by implementing different adaptation measures.[48]

[47] IPCC (2007a), p. 249, 749
[48] Lindgren (2010)

Changes in *mean values* in temperatures and sea levels will, for example, give rise to new cultivation seasons and changes to the coastline. While such changes will be creeping and occur only gradually – being most comprehensive in the long term, the increased occurrence of extreme climate events could be noticeable in the short term. It is not possible, however, to establish whether a single climate event is linked to climate change or to normal climate variability.

The regional effects of climate change vary significantly. The mean temperatures will, for example, be higher in the most northern latitudes and the precipitation will most likely increase in high latitudes and decrease in most subtropical land regions.[49] Many countries in Africa are already badly affected by natural hazards and it is believed that many of these will occur more often and with more severe consequences in the future.[50] The negative impacts of climate change in Africa will depend on the continent's exposure to extreme weather and environmental stresses, on the level of resilience of individuals, communities and states, and on their adaptation capacity. Levels of resilience and adaptation capacity are expected to be low.[51]

2.2.2 Vulnerability to climate change

The consequences of climate change to a society depend on the magnitude of climate change, of how sensitive the society is to these changes and how capable it is to handle negative consequences. Taken together, these factors describe the society's vulnerability to climate change. There are two common interpretations of vulnerability: *end-point vulnerability* and *starting-point vulnerability*, also known as the 'outcome' and 'contextual' approaches.

The components of vulnerability

Starting with the components of vulnerability, it is defined by a system's *exposure* to climate change, the *sensitivity* of the system to climate change, and the *adaptive capacity* of the system in coping with the effects as elaborated below.

Exposure relates to the magnitude and frequency of climatic variables such as temperature, precipitation, wind or humidity. It can be represented by long-term mean value changes or by changes in the magnitude and frequency of extreme events. Exposure is an external component, independent of the system studied, that can be defined for current and future conditions. Exposure to climate change is primarily a function of geography. Coastal regions will have a higher exposure

[49] IPCC (2007a). pp749-750
[50] Ibid. pp 444-451
[51] IPCC (2007b), p 435

to rises in sea levels and cyclones, while semi-arid areas would be most exposed to droughts. Exposure will also change with time – a change that cannot be predicted without uncertainty since, among other factors, it depends on the world's efforts to reduce emissions of greenhouse gases.

Sensitivity is the degree to which a system is affected, either adversely or beneficially, by exposure to climate change. A system can, for example, be a water resource, crop production, forest growth or human health. The effect may be direct (e.g. a deterioration in crop yield due to changes in the temperature) or indirect (e.g. damage caused to infrastructure by coastal flooding due to sea-level rise). It is not always straight-forward to estimate the sensitivity of a system, such as agriculture, in a future climate scenario. Instead, a common approach is to identify variables that may influence sensitivity, such as irrigation rates, land degradation and crop diversification.[52]

Adaptive capacity reflects the ability of the system to modify behaviour in order to cope with exposure to climate change. Adaptive capacity depends on the context and varies over time and between different systems, groups or communities. Adaptive capacity typically depends on factors such as wealth, technology, government, education and infrastructure, and can be divided into social, human, financial and physical capital. Adaptive capacity includes the ability to avoid the severe consequences of a climate event, to handle a crisis if it occurs and to take advantage of any beneficial impacts. However, a high adaptive capacity does not automatically mean that a society will adapt when exposed to climate change.

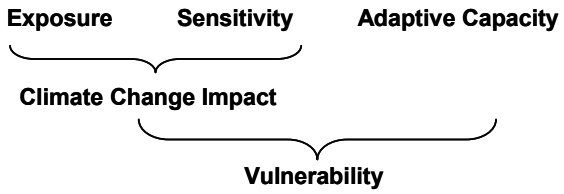

Figure 3. Vulnerability to climate change

As already mentioned, exposure is an *external* component. It is dependent on time and geography, but not on the system under study. Sensitivity and adaptation capacity are both *internal* components, that is, they depend on the system studied and cannot be characterised until the unit of analysis is defined.

As set out in figure 3 above, exposure and sensitivity taken together describe *the impact of climate change* on a system. A precondition for an impact (e.g. a flooded infrastructure) is that the system is both exposed to a climatic stress (e.g.

[52] Gbetibouo and Ringler (2009)

heavy rainfall) and sensitive to this exposure (e.g. lacks drainage areas). If either the exposure or the sensitivity is missing, the impact will not occur. Due to this relationship, it is sometimes useful to consider the impact instead of the exposure and sensitivity separately.[53]

To reduce vulnerability, the vulnerable system has to adapt to the new climate. Adaptation to climate change can be interpreted as adjustments in a system in response to the impacts of climate change in order to moderate harm or exploit beneficial opportunities.[54] Adaptation may for example involve measures to handle rising sea levels or to increase the society's coping range to climate hazards, as was pointed out in Figure 2. Adaptation is often performed on a local level by local people that know the local circumstances. While studying different measures to reduce vulnerability, it is therefore important to study the local context, even if the national, regional and global level also will influence the possibilities to adapt.

Different approaches to vulnerability

As the names of the two major approaches to vulnerability, i.e. end-point and starting-point, reveal, the basic difference lies between *when* in the adaption process the vulnerability is studied.

End-point vulnerability has been defined as the estimated remaining vulnerability of a biophysical or social system after adaptation has been performed (for a social system it is assumed that existing adaptive capacity is used to adapt to climate change).[55] To estimate end-point vulnerability it is necessary to establish the time period studied. In addition, it is essential to have access to climate projections for that time horizon and to understand the capacity of the system, or the society, to adapt during this time period.

A common approach when studying end-point vulnerabilities is to calculate a vulnerability index, which is a weighted average of selected variables representing exposure, sensitivity and adaptive capacity. Since exposure to climate change has a geographical component, the indices are often shown as maps, representing different time periods, with different colours indicating the number of the indices.[56] The obvious weakness of this approach is that it captures a complex system in one figure. Such studies can be valuable, however, for monitoring trends and exploring conceptual frameworks.[57]

[53] See for example the CARAVAN project, www.iav-mapping.net/CARAVAN
[54] IPCC (2007), p. 869
[55] O'Brien et al. (2007), p. 75
[56] See for example Yusuf and Francisco (2009)
[57] Gbetibouo and Ringler (2009)

In contrast to end-point vulnerability, *starting-point vulnerability* has been defined as: "a present inability to cope with external pressures or changes, which in this case is the climate conditions".[58]

Starting-point vulnerability consequently addresses present-day vulnerability, assuming that this will facilitate a reduction in vulnerability under future climate conditions.[59] Future vulnerability will depend on the current vulnerability and to what extent current adaptation capacity is used to realise adaptation.[60] In contrast to the end-point approach, there is no need to establish a time horizon for the study, and there is no need for future climate projections. Still, if future vulnerabilities are to be studied, it is important to understand future climate trends.

The components of end-point vulnerability – exposure, sensitivity and adaptation capacity – are valid for both approaches to vulnerability, even if they are more explicit in the definition of end-point vulnerabilities. However, for starting-point vulnerability the adaptation capacity may rather be interpreted as society's short term coping capacity than its ability of implementing long-term adaptation strategies.

In a synthesis article, O'Brien et al. discuss when different interpretations of vulnerability have been used in climate change studies. The end-point approach has typically been chosen to answer questions such as the extent to which human activities contribute to dangerous climate change impacts, and which sectors are likely to be negatively affected. The starting-point approach, on the other hand, has been used to answer questions such as whether climate change is a genuine problem and why some regions and social groups are more vulnerable than others. Studies closely linked to starting-point vulnerability focus on current climate variability, livelihoods, coping strategies and political economy, including entitlements and social capital.[61]

Starting-point vulnerability and human security have in common that they are context-based and focus on the local level. This is also the main interest for this study, for which reason we have chosen the perspective of starting-point vulnerability. This means that we have a focus on current vulnerabilities to climate and climate variability in the case study areas, and that we take these as a starting point in the process of understanding how future vulnerabilities to climate change can be reduced. Future climate change is mainly treated as trends without any specific scenarios or time horizons.

[58] O'Brien et al. (2007), p. 75
[59] Ibid. p. 75
[60] Adger et. al (2004), p. 38
[61] O'Brien (2007), p 78–79

Vulnerability is critically dependent on the context. Factors making one society vulnerable to e.g. droughts (such as limited access to groundwater) may not be the same as those making a society in another part of the world vulnerable to flooding (such as lack of early-warning systems). However, there are generic factors that are likely to influence vulnerability to a wide variety of climate hazards for different geographical and socio-political contexts. Such factors are poverty, health status, education, economic inequality and elements of governance. The generic factors are useful to compare the level of vulnerability between nations or regions.[62] However, when depicting the vulnerability in a specific area, it is important also to identify context-dependent factors.

Different factors influence the vulnerability in different time perspectives. Brooks et. al. states for example that mortality on a national level as a consequence of climate hazards in the short-term is related to sanitation (health status), in the medium-term to the governance effectiveness and in the long-term to the literacy rate between age of 15 and 24.[63]

[62] See for example Brooks et. al. (2005) who identify 11 generic factors, showing the relationship between climate hazards and mortality on a national level.
[63] Brooks et. al. (2005)

3 Case study areas

As already mentioned, this study aims to deepen the understanding of the vulnerability of human security to climate change in two areas in the Zambezi River Basin. The two areas, Chinde District of Mozambique and Bulawayo in Zimbabwe, have been identified in a preceding study by Swain et al. within the same overall programme (*Climate Change, Natural Resource Governance, and Conflict Prevention in Africa*) as the most likely areas in the Basin to experience climate-induced conflicts in the near future. Following the overview of the region of the Zambezi River Basin below, the areas are shortly described in this section with respect to factors influencing the vulnerability to climate change, i.e. current climate hazard, systems and livelihoods sensitive to climate hazards and factors influencing the coping capacity of the societies in the area. Both areas under study are introduced through briefly situating them in the political context of their respective countries, as this context is likely to influence the analysis of climate change-induced threat multipliers' links to potential for conflict.

3.1 The Zambezi River Basin

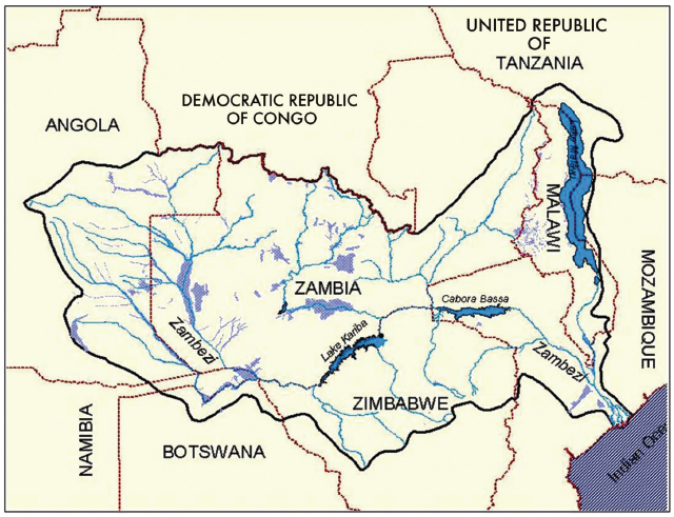

Figure 4. The Zambezi River Basin[64]

The Zambezi River, together with is tributaries, forms the fourth-largest river basin in Africa (see Figure 4). It covers an area of 1.37 million square kilometres

[64] SARDC and HBS (2010)

and is inhabited by approximately 30 million people. The population is expected to grow to 47 million by 2025 with increased urbanisation.[65] The 3,540-km long Zambezi River has its source in Zambia, 1,450 metres above sea level, and its mouth at the Indian Ocean. The Basin is a diverse and valuable resource in Africa, and it plays a central role in the economies of the eight riparian countries: Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe.[66] There are more than 30 large dams in the Basin, supplying water for domestic, industrial and mining uses, and for irrigation and power generation.[67] The main economic activities are fisheries, mining, agriculture, tourism and manufacturing. Industry in the region is partly dependent on electricity produced in hydroelectric plants in the Basin.[68]

The river is also a vital source of drinking water, agricultural irrigation and transportation.

However, the Basin is vulnerable to current climate hazards and suffers from floods, droughts and, in the coastal areas, cyclones.[69] The area will consequently be vulnerable to future climate change when such hazards are predicted to be more common. Each year hundreds of thousands of people in the area are affected by climate disasters resulting in the loss of lives and assets, the displacement of people, starvation, epidemics of water- and vector-borne diseases, environmental degradation and animal attacks.[70]

The river basin as a whole has an annual rainfall of about 950 mm. Less than 10 per cent of this amount contributes to the flow of the Zambezi River to the Indian Ocean. The rest evaporates into the atmosphere. According to the Zambezi River Authority, water use in 2008 was about 20 per cent of the total Basin run-off. Irrigation and environmental use as well as domestic and industrial water supply require only a minor part of this run-off. Thus, for the Zambezi Basin as whole, water availability is greater than water requirements, but there is a high degree of seasonal and spatial variability in the availability of water resources and in the demand for water in different areas.[71]

After the construction of the Kariba dam in 1959 and the Cahora dam in 1974, nearly 90 per cent of the Zambezi catchment area has been regulated and there are no longer any natural flood cycles in the lower part of the Zambezi River. Flooding is now unpredictable for local communities. Water levels can change

[65] SADC-WD and ZRA (2008), p. 2
[66] World Bank (2010), pp. 1-4
[67] CSIR (2003), p 27
[68] World Bank (2010), p. 7
[69] IFRC (2010), pp. 4–5
[70] Ibid. p. 9
[71] SADC-WD and ZRA (2008), pp. 2–3

immensely in hours, and people in the lower Zambezi complain about the government's regulation and the lack of warning.[72]

Floods, droughts and cyclones are predicted to become more frequent and more severe in the future due to climate change. Expected increases in tropical sea surface temperatures will result in more intense tropical storms with higher wind peaks and heavier precipitation.[73] Although the whole area of the Zambezi River Basin is quite vulnerable to climate exposure, Mozambique and Zimbabwe are assumed to be among the most vulnerable countries in the area when analysing the influence of physical exposure, household and community resources, governance and political violence and population density.[74] The challenges in the two countries related to climate change are shown in Table 1. As can be seen, many problems are common in the two countries. Mozambique, however, in contrast to Zimbabwe also has to meet an increased frequency of cyclones, overflowing of large rivers, sea level rise and salt water intrusion.

Table 1. Summary of climatic challenges in Mozambique and Zimbabwe[75]

Climate change	Mozambique	Zimbabwe
Increase in temperature	X	X
Increased incidence of droughts	X	X
Decrease in rainfall	X	X
Seasonal shift in rainfall	X	X
Cyclones	X	
Local floods	X	X
Overflowing of large rivers	X	
Decreased/varying river flows	X	X
Wildfires	X	X
Sea level rise	X	
Salt water intrusion	X	

At present, the coastal area of Mozambique is highly vulnerable to cyclones. In 2007, *Cyclone Favio* hit Mozambique and parts of Zimbabwe, resulting in 700

[72] Swain et al. (2011), p. 83
[73] SARDC and HBS (2010), p 12
[74] As shown in figure 5 presented in Busby et al. (2010), p. 33
[75] SARDC and HBS (2010), p 10

deaths and more than 500,000 homeless people.[76] In addition to cyclones, coastal areas also suffer from erosion due to high sea levels which will rise due to climate change, hence exacerbating these problems. Droughts occur in both countries, but are much more frequent and severe in Zimbabwe where they affect several million people each year.[77] In Mozambique, droughts tend to occur every three to four years, [78] especially in the southern and central parts of the country – including the Chinde Delta region.[79] Flooding occurs most often in the rainy season, causing infrastructure damage and the destruction of schools, crops, telecommunications and roads. Flooding is worse in the lower part of the Zambezi River, partly due to the unpredictable water level due to water regulations. While floods result mainly in the loss of economic assets, such as settlement and infrastructure, droughts result in the loss of life.[80] Severe storms and earthquakes can happen, but are rare.[81]

3.2 Chinde District

3.2.1 The wider political context of Mozambique

Ever since its independence Mozambique has had a violent and conflictual political context. The Mozambican political elites' roots are to be found in its freedom movement against Portugal and the following civil war.[82] The leading partisan fraction FRELIMO (Front of the Liberation of Mozambique) formed a Marxist-Leninist state in 1975, backed by USSR. However, fighting with the competing fraction RENAMO (Mozambique National Resistance), supported by South Africa and former Rhodesia, continued until 1992. The civil war led to the death of an estimated one million people and displacement of millions more.[83] In 1990, after a stalemate in the civil war and a decreasing USSR support, Mozambique introduced a multi-party system. Although fighting ceased in 1992, the struggle between the regime and the opposition continued through party bodies and numerous acts of political violence prevailed throughout the nation's modern history. RENAMO's transition to a political party was completed in 1994 when the nation's first democratic elections took place, which was riddled with violence. In the elections of 1999, RENAMO party President Afonso Dhlakama refused to accept the defeat and civil unrest and demonstrations broke out. FRELIMO, in control of the security sector, met the protests with force

[76] SARDC and HBS (2010), p 15
[77] WFP (2011b)
[78] WFP (2010)
[79] WFP (2011a)
[80] Prevention Web (2011a)
[81] Prevention Web (2011b)
[82] Swain et al. (2011) p.88
[83] Freedom House (2010) Maps of freedom, Mozambique

leaving more than a hundred dead in its aftermath.[84] RENAMO has at several occasions threatened to return to civil war if not given power in accordance to its suggested support among the population.[85]

Throughout both the independence war and the civil war all sides mobilized and targeted civilians and enforced their policies through forced displacement, violence, raids and executions.[86] The attempts from former FRELIMO President Joacim Chissano to consolidate and reconcile the nation, through the introduction of the multi-party system, was thwarted in 2002 when the infamous hardliner Armando Guebuza took over in office and as party president for FRELIMO.[87] Guebuza and his fraction of liberation- and civil war veterans took an increasingly belligerent stance against all opposition[88], including the new parties MDM and PPDD.[89] In the 2009 election, RENAMO lost control of the Zambezia province, which hosts Chinde District. This province is a traditional and important stronghold for the opposition party. FRELIMO's political encirclement of RENAMO's traditional holds is increasing the tensions within RENAMO, leading to the breakaway fractions such as MDM and PPDD.[90]

Although the general economic situation is improving, popular unrest and riots have been reoccurring features in Mozambique, both in response to challenges to political and individual security but lately foremost against the rising prices of food and basic utilities, highlighting the distribution and access to livelihood and security regarding food, economy and health. Corruption and lack of transparency of institutions handling such distributions has also resulted in an increased pressure for democratic reforms from donor organisations, which make up for almost fifty per cent of the state budget.[91]

FRELIMO has been in power ever since independence yet the party has not been personalized as in the case of ZANU-PF and Robert Mugabe. Although there are conflicting views and priorities within FRELIMO, it has developed a strong and well institutionalised elite during its rule.[92] This elite has not hesitated to respond with force when their posture is challenged by others, for example by elites within RENAMO. There are also repeated events where FRELIMO elites have

[84] Swain et al. (2011) pp.87-89
[85] Swain et al. (2011) p.92
[86] Ibid. p.88
[87] Freedom House (2011) Maps of freedom, Mozambique
[88] Swain et al. (2011), p,89
[89] MDM (the Mozambique Democratic Movement) was founded 2009 by former RENAMO official Daviz Simango. A party with similar background is PPDD (Party for peace, democracy and development) that was founded in 2003 by former RENAMO guerrilla's Chief of staff, Raoul Domingos.
[90] Swain et al. (2011) pp.92,-93
[91] Freedom House (2011) Maps of freedom, Mozambique
[92] Hanlon et al. (2010) p.2

utilised illegal extrajudicial measures to silence protestors, manipulated criminal courts or even ordered the execution of journalists.[93]

Hanlon et al. identifies distinct time periods of the Mozambican political and economic development with the FRELIMO elite. They argue that the elite, ever since the early nineties, has sought to develop a strong market economy in accordance with IMF policy, thus Mozambique became a "donor darling". However, the dismantling of former collective institutions lead to an increased corruption when the FRELIMO elite themselves took control over many privatised operations and distributed its wealth through its own ranks.[94] According to Hanlon et al. the transformation from "socialism" to "predator capitalism" enriched the elite patronage and released a wave of corruption.[95] FRELIMO President Guebuza himself is one of the richest men in Mozambique yet is formerly a political commissar with the army.[96] It is therefore fair to argue that there are also personal and economic gains at stake beside the seemingly political polemic between FRELIMO and the opposition.

Political control of Zambezia is a high priority for all political parties. The province was a strategic position during the civil war and remains as such in the political struggle between FRELIMO and the opposition. The Zambezia province holds the second most number of representatives in the national parliament and is, as previously mentioned, an important stronghold of RENAMO.[97] In the history of Zambezia, conflicting priorities has often meant employment of force and aggravated accusations of malign political motives with the government or the opposition. According to Swain et al. the opposition is playing on the marginalisation of the Northern provinces and the regime's lack of investment and development projects there compared to the southern provinces described as FRELIMO "heart land".[98]

[93] Swain et al. (2011) pp. 98-99
[94] Ibid. pp.3-4
[95] Ibid, (2010) p.5-6
[96] Ibid. (2010) p.1
[97] Swain et al. (2011) p. 90
[98] Ibid. (2011) p.102

3.2.2 Chinde District – vulnerability to climate change

Chinde District is located in the southernmost part of Zambezia Province in Mozambique, next to the Indian Ocean (see Figure 5). It covers the Zambezi River delta, which is a complex and dense river network formed by numerous streams and river branches.[99] The district had about 129,000 inhabitants in 1997, which decreased to 120,000 inhabitants in 2007. [100] Most people, 83 per cent in 2005, live in rural areas. The remaining 17 per cent are concentrated in the two towns of Chinde and Luabo.[101] Chinde is the capital of the district and is situated on the coast. It had about 16,500 inhabitants in 1980.[102] There are two main livelihood activities in the Chinde District; fishing in the Zambezi River and agriculture.

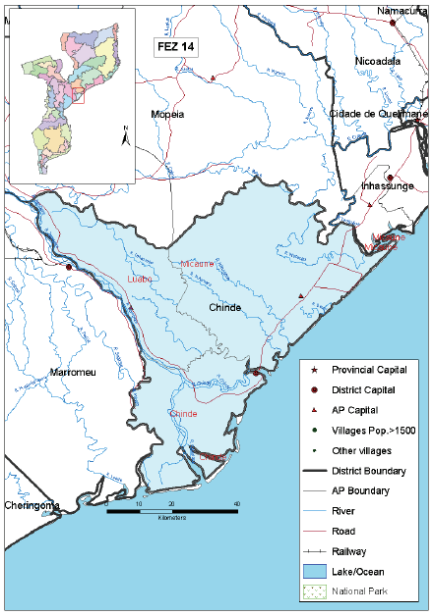

Figure 5. Chinde District.[103]

Livestock and poultry keeping are, on the other hand, minimal. Most of the population practice agriculture by growing rice, maize, cassava, sweet potatoes, sugar cane and vegetables.[104] Agriculture is mostly practiced on small farms manually under rain fed conditions.[105] The conditions for agriculture are better in villages near the river, where it is possible to grow second-season crops. In 2008, much of the land in Chinde district was owned by the sugar refinery Companhia de Sena. This restricted local farming in some parts of the district. The poorest quarter of the population do not have enough land area to cultivate more than half their food needs. They have to work for better-off households in addition to farming.[106]

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[99] MAE (2005), p. 26.
[100] MAE (2005) and INE (2008). According to the National Institute of Statistics in Mozambique, INE (2008), p. 7, only 3 per cent of the population of Zambezia Province lives in Chinde District.
[101] MAE (2005), p. 10
[102] Chinde. (2011). In Encyclopedia Britannica. Retrieved from http://www.britannica.com/EBchecked/topic/112278/Chinde, 2011-03-10
[103] FEWS-NET (2008)
[104] Ibid.
[105] MAE (2005), p. 14
[106] FEWS-NET (2008)

Fishing is the major source of income for only a small part of the population of Chinde, but about one-third of the population fishes as a complement to farming and labour. Fishing is most advantageous during high water, which occurs between January and March/April. The main constraint to fishing, as well as to farming on the islands in the delta, is the danger of crocodiles. Many people are killed by crocodiles every year, particularly when there is low-water, which is why many fishermen choose not to fish all year round.[107]

Trade is limited since access to the district is difficult. The transport infrastructure is poor and roads are only passable in the dry season. During the rainy season, people and goods are transported by river, mainly by canoe. The limited market interaction with neighbouring areas means that there is little integration of the local economy with the rest of the country. However, there are some trade activities, including producing and selling mats, distilling rum and selling natural resources from the forest. Such activities are mainly carried out in the dry season.[108] The most important income for the district's inhabitants, except for the poorest 25 per cent of the population, is the sale of crops. Other income sources are the sale of fish and agricultural labour.[109] As a result of the limited availability of trade, the region operates largely as a subsistence area, with only small quantities of food leaving or entering the area.[110]

Chinde District is prone to flooding, especially during the growing season. The impacts of flooding vary between the villages since a number of them are protected by dykes. While some villages benefit from minor floods, which bring good harvests, others lose their harvests due to heavier floods. Areas of greater risk of flooding have higher production potential and some low-lying areas by the river and on islands in the delta can benefit from a second growing season. The flooding has become more common in recent years and can now occur twice a year. The Government policy is to encourage people to move away from the riverbanks to higher ground.[111] In the 2007–2008 floods, 2,564 families (12,820 people) in Chinde District had to move to resettlement centres.[112]

Although Chinde is not located in the areas of Mozambique most prone to drought,[113] there can be poor rains every three to five years, which primarily affects the harvest of rice and maize. Cassava is usually resistant. Fishing is also negatively affected across the district when poor rains affect the river flow.[114] Cyclones normally occur along the coastal regions of Mozambique from October

[107] FEWS-NET (2008)
[108] FEWS-NET (2008)
[109] Ibid.
[110] Ibid. p. 2
[111] Ibid.
[112] Sérgio (2010)
[113] MICOA (2007), Figure 4, p. 17
[114] FEWS-NET (2008)

to April. They are often accompanied by torrential rain as well as damages to infrastructure and private property. Chinde District is classified as belonging to risk zone two in Mozambique on a scale of one to five.[115]

3.3 Bulawayo

3.3.1 The wider political context of Zimbabwe

The modern history of political violence in Zimbabwe starts with the long independence war in the sixties and seventies in what was formerly known as Rhodesia.[116] This independence struggle against white minority rule was led by two main factions the Shona-dominated ZANU and its armed wing ZANLA on the one hand and the Ndebele-dominated ZAPU and its armed wing ZIPRA on the other. Following this struggle, Zimbabwe gained independence in 1980, under the leadership of Robert Mugabe and his ZANU-party. Despite this, the expected democratic transition has been slow to progress. Only a few years into independence, the ruling regime cracked down on the ZAPU opposition, culminating in large scale killings of members of the Ndebele population, known as the Gukurahundi massacres. The Ndebele population, whose capital is Bulawayo, was seen as directly engaged in, or supportive of, the ZAPU opposition in the eighties and in the absence of any real reconciliation effort, this still lingers in the conflict narrative.[117] After bitter fighting between ZAPU and ZANU, the two parties "merged" in 1987, creating the ZANU-PF. Consequently, throughout its history as an independent nation, Zimbabwe has been ruled by President Robert Mugabe[118], and until 2009, exclusively by his ZANU-PF party. With the emergence of a new opposition party, the MDC, in the late 1990s, a decade of political tensions followed. As this coincided with a turbulent land-reform programme, withdrawal of donor support due to democratic deficits as well as macro-economic mismanagement, the economy and agricultural production tumbled to record-low levels. In 2008, a particularly violent election took place.[119] After international pressure, an inclusive government was formed among the rivals leaving Morgan Tsvangirai, leader of MDC-T, the post as Prime minister, while Robert Mugabe remained as President.

Political violence and employment of authoritarian measures are derived from a long series of conflictive beliefs; and the identification within ZANU-PF as the

[115] MICOA (2007), according to the map on p. 23
[116] Freedom house Zimbabwe country report (2011)
[117] Ibid.
[118] During the first year(s), Mugabe was Prime Minister, a position that was abolished when he assumed office as president. The post as Prime Minister was reinstated when MDC gained representation in the inclusive government.
[119] Freedom house Zimbabwe country report (2011)

sole legitimate power in Zimbabwe and as head upholder of the patronage, securing key interests, such as the distribution of land, water and access to infrastructure and service.

Imbalances in access to farmland and the distribution of infrastructure and service have since independence created tension in Zimbabwe and land redistribution has been used by the regime to create sufficient support among key actors and fractions.[120] Indeed, the fast-track land reform programme was initiated as Robert Mugabe was faced with the emergence of a surprisingly forceful opposition, MDC, and soon after he had lost a constitutional referendum in 2000. This could therefore be seen as a way of favouring those fractions aligned with the regime. Still, the tensions concerning land distribution cannot be brought down to a single issue, since they are multidimensional and include issues of race, post-colonial conflictive beliefs, traditional geographic domicile, political allegiance and posture in the Zimbabwean client-patronage network.[121]

The armed forces play a determining role in the party's dominance within its patronage. Hence, in order to secure loyalty, the government has distributed access to resources and institutions along the ranks of its military and security forces.[122]

It could therefore be argued that although the nation gained independence from its colonial masters it did not change the repressive nature of the state's institutions themselves:

> Coupled with this problem of turning the military on its own citizens, Zimbabwe has developed a culture of impunity for human right abuses committed by members of the security sector and its leadership.[123]

The regime's identification of Matabeleland and Bulawayo as oppositional strongholds may put the regions inhabitants at specific risk at becoming further subjected to violence and authoritative measures and exclusion from patron-client networks.

3.3.2 Bulawayo – vulnerability to climate change

Bulawayo is the second-largest city in Zimbabwe after Harare. It is located in the province of Bulawayo, one of three provinces in the region Matabeleland in the south-western part of Zimbabwe (see Figure 6). The city of Bulawayo is situated on a high plateau along the Matsheumhlope River, 1,341 metres above sea level, close to the watershed of two drainage basins, the Zambezi and Limpopo.

[120] Freedom house Zimbabwe country report (2011) p.82
[121] Moyo (2002), p. 164
[122] SPT (april 2006) p.12 MacDermott (2009) p.23
[123] MacDermott (2009) p. 43

Figure 6. Bulawayo in south-west Zimbabwe.[124]

Since Bulawayo is situated at such high altitude, the climate is subtropical with a mean annual temperature of 19.2 ºC. The winter season, from May to August, is dry and cool; the early summer from late August to early November is hot and dry; and the rest of the summer, between early November and April, is warm and wet. The annual average rainfall is 590 mm. The rainfall tends to vary from one year to another and the city is vulnerable to droughts. [125]

Bulawayo lies in a water-scarce and drought-prone area. Water has become increasingly scarce and costly in the city because surface water resources are limited and rainfall unreliable.[126] In the south, five dams situated in a catchment area with relatively low rainfall supply the city with water. As a complement, 220 boreholes scattered throughout the city act as standby supply during droughts.[127] Treated wastewater is a third source of water, which is mainly used for irrigation. It has the disadvantage of being scarcest when most needed – during droughts.[128] The chronic water shortage applies to both domestic and industrial uses. As a consequence, water is frequently rationed. During such periods it is forbidden to use hosepipes or any other form of watering of gardens with municipal water.[129]

Bulawayo has an official population of 731,000 inhabitants in 2008.[130] Independent estimates, however, put the population at 1.5 million,[131] with a slight dominance of women (52 per cent) over men (48 per cent). Bulawayo has

[124] www.zimbabwe.embassyhomepage.com
[125] www.wikipedia.org, accessed 2011-03-10
[126] MDP and RUAF (2007c)
[127] MDP and RUAF (2007d)
[128] MDP and RUAF (2007c)
[129] MDP and RUAF (2007d)
[130] Nationalencyclopedin, http://www.ne.se/lang/bulawayo, accessed 2011-03-10
[131] MPD and RUAF (2007b)

traditionally been the economically strongest city in Zimbabwe and the leading industrial centre, manufacturing, for example, cars, building materials, electronics and furniture.[132] Bulawayo lies at the hub of a national and regional railway network.[133] While this railway network has lost much of its earlier importance, Bulawayo remains a junction point for the flow of goods between Zimbabwe and South Africa.[134] The city is also an important marketing and distribution centre for the primary produce of the region.[135] The city lacks good air links to other countries, however, and to most centres in Zimbabwe other than Harare.[136]

As a result of recent economic crises in Zimbabwe, many firms have closed or been relocated to Harare, and the unemployment rate in the formal sector has increased to an estimated 80 per cent. As a consequence, the poverty level in the city has increased and is estimated to be around 60 per cent of the population, based on average household basic food needs.[137] To make a contribution to income, and also for domestic consumption, urban agriculture has grown strongly. The City of Bulawayo has nine irrigated garden allotments totalling 25 ha., and a gum plantation allotment of 450 ha. where households have access to plots for cultivation. However, there is an increasing demand for land and the uncertain weather pattern, characterised by poor rains and drought, makes farming difficult and unpredictable and water access a big challenge.[138]

[132] Nationalencyclopedin, http://www.ne.se/lang/bulawayo, accessed 2011-03-10
[133] MDP and RUAF (2007a)
[134] Nationalencyclopedin, http://www.ne.se/lang/bulawayo, accessed 2011-03-10
[135] MDP and RUAF (2007a)
[136] Ibid.
[137] RUAF (2010) www.ruaf.org/node/503, assessed 2011-03-24
[138] Ibid.

4 The potential impact of climate change on human security in Chinde District and in Bulawayo

In this section we discuss how the already low human security in the rural Chinde District and in the city of Bulawayo may be further weakened by the impacts of climate change. As stated in section 2.2, we have chosen a starting-point approach towards vulnerabilities, which means that we look at current vulnerabilities to climate, including climate variability, as a foundation for discussing vulnerabilities to future climate change. Human security is affected by many factors that individuals cannot influence, such as the world economy, globalisation and changes in demography, among which climate change only is one factor. In this chapter, however, the focus lies on the relation between climate change and human insecurity – the relationship that constitutes vulnerability to climate change. In chapter 5 we discuss how these vulnerabilities may exacerbate lines of tension in the two case areas studied.

As pointed out in section 2.1, human security can be divided into seven categories.[139] The first, environmental security is directly affected by climate change. Droughts might, for example, threat wetlands and other ecosystems. The next three categories, economic, food and health security, are also almost directly affected by climate change or affected by changes in the environmental security. Droughts may affect the economic security by destroying crops and thereby the preconditions for a stable income. Droughts may also affect food security by limiting access of sufficient amounts of food. It will further affect health security by causing water scarcity and increasing the spread of diseases. The impacts of climate change on these four categories of human security are discussed in this section, in the Zambezi River Basin in general and in Chinde District and in Bulawayo in particular.

The last three categories of human security, personal, community and political security may also be affected by for example droughts, but in a more indirect way through chains of events that can be difficult to foresee and describe. These impacts often occur as a result of an increased environmental, economic, food and health insecurity due to climate change, and are highly dependent on the political situation and the society studied. Since there is no obvious way to describe the mechanisms of how climate change affect the last three categories of human security, we instead discuss links between human insecurity caused by climate change and possible lines of tension in chapter 5.

[139] As defined by UNDP (1994)

4.1 Environmental security

Environmental security has to do with ecosystems and natural resources that human beings rely upon. Such systems and resources are often directly impacted by climate hazards, which in turn will have impacts on the economic, food and health security.

Most ecological systems in the Zambezi River Basin will be affected by climate change and there is a high risk of loss of biodiversity, such as terrestrial and aquatic species of both animals and plants. The problem is expected to be worse along small streams than in larger rivers, since the latter will be affected less rapidly.[140] The quantity and quality of water in the Zambezi River is expected to be affected by changes in flood patterns and dry periods and by changes in temperature. This will, in turn, affect fishery stocks, agricultural irrigation, transports, industry and hydroelectric energy production, which are essential for people living in the Basin. Clean water for domestic use will also be reduced. Wetlands are expected to be badly affected by evaporation, which, in turn, could increase food insecurity in the region. Deforestation is also expected to increase, often in combination with overgrazing and poor conservation methods.[141]

Climate hazards such as droughts, extreme rainfall and cyclones will also contribute to the damage of natural resources in the Basin by other mechanisms. For example, water resources may be polluted by salt water intrusion and bacteria from waste water, and land resources, including agricultural land, may be destroyed by heat stress and erosion.

4.1.1 Impacts on environmental security in Chinde District

The reduction in rainfall and increased evaporation will threaten wetlands.[142] Wetlands, together with mangroves, are an important source of firewood, wild food and medicine for households in Chinde district. Mangroves also provide fishing opportunities and opportunities for tourism. They regulate the tides and sedimentation and act as a protective barrier against storms and erosion. Climate change will result in a loss of habitats such as mangroves and is likely to induce a shift in the range of species and of trees, adding further stress to forest ecosystems.[143] Rising sea levels will cause saltwater intrusion in the delta, further degrading water quality and ecosystems. However, marshland vegetation in the delta could provide some natural resistance to such intrusion.[144]

[140] WWF (2003)
[141] Ibid.
[142] SARDC and HBS (2010), p. 18
[143] Ibid. pp 17–18
[144] Ibid. p 14

4.1.2 Impacts on environmental security in Bulawayo

There is already a high degree of environmental insecurity in Bulawayo. Deforestation is widespread in the peripheral parts of the urban area. In the western areas, sand mining for construction purposes threatens the environment and areas that could potentially be used for cultivation. Waste dumped in open spaces is a problem, as are polluted watercourses. There has also been evidence of soil salinisation in some areas, and veld fires are frequent,[145] a problem that is likely to be exacerbated by climate-induced droughts. Climate change will put further stress on the already insecure environment. Possibly the largest problem to tackle will be the reduced run-off, which will exacerbate current water stress resulting in a reduction in the quality and quantity of water.[146]

4.2 Economic security

The economic security depends on several factors, among which employment, national economy, governmental safety nets and education play crucial roles in the Zambezi River Basin.

Several income sources in the Zambezi River Basin, such as manufacturing industries and the formal and informal service sectors are likely to be affected by climate change. Decreased precipitation and increased evaporation is already a problem for industries along the Zambezi River since this makes the hydro-electric energy production irregular, also influencing employment.[147] The energy supply is expected to be reduced with climate change, which will affect agricultural production and industry negatively. Production in general is also vulnerable to floods and cyclones that could damage factories, markets, communities, buildings, harvests and infrastructure. As many households in the region suffer from chronic poverty, and have relatively few economic resources and poor access to income and employment, their coping capacities are limited, making the effect of climate change even more severe.[148]

Reduced domestic production increases pressure to expand imports, thereby increasing the trade deficit. It will also lead to the weakening of the national economy and reduce the ability to export. An unstable environmental, political and macro-economic situation is also likely to scare off foreign investors, negatively affecting the income and development of industry. As the impacts of climate change reduce the production of food, the supply of food to the market decreases. Decreased food supply generally increases local prices, consequently reducing the purchasing power of most households. Some groups, mainly larger

[145] MDP and RUAF (2007a)
[146] SARDC and HBS (2010), p. 18
[147] Swain et al. (2011), pp. 42-43
[148] FAO and WFP (2008)

and capital-rich commercial farmers, however, could profit from increased prices, as they may have access to irrigation schemes, their own transportation and asset reserves.[149]

The state may become unable to provide adequate public safety-nets. As both weak states and poor households have less capacity to withstand the impacts of climate change, they will also be relatively harder hit.[150] Natural disasters generally increase the need for emergency aid, health care and the handling of possible mass movements, as well as reconstruction efforts, such as for infrastructure.[151]

The educational status in the region varies. A low education status contributes to a low adaptation capacity[152] which is supposed to influence the economic security negatively both in the short- and the long-term since it limit the individual's choice of labour. In Mozambique, some 80 per cent of children of 6–12 years old were enrolled in school in 2008.[153] The literacy rate in the country is relatively low – in favour of males – with only half of the population being able to read and write. This worsens the economic conditions of households.[154] In Zimbabwe, on the other hand, the literacy rate is 90 per cent and the average length of schooling is nine years.[155]

4.2.1 Impacts on economic security in Chinde District

In the Chinde District, the main livelihoods are rain-fed agriculture and water-level dependent fishing, which are sensitive to floods, droughts and cyclones – events that are predicted to occur more frequently with climate change. Sugar cane, which is the main cash crop in the Chinde District, has become predominant due to its better resilience to the effects of flooding. Sugar production may, however, be affected by droughts. Most landowning households by the river are able to harvest twice a year, thereby earning more income. But they are also directly affected by the floods. Usually, the extra income from two harvests will exceed the loss of income caused by flooding. It should be noted that while fishing may provide extra income, it also implies an extra risk from crocodiles which pose a greater risk during low-water. Flooding will also affect the region's already poor infrastructure, both in terms of access to the limited number of roads and the ability to travel by canoe on the river, further limiting trade opportunities. Although trade between the isolated region and the outside is

[149] O'Brien and Leichenko (2007/2008), p. 12
[150] Ibid. p. 12
[151] O'Brien et al. (2008), p. 12
[152] See for example Brooks et. al. (2005), p.155
[153] UNDP (2011d)
[154] World Factbook (2011a)
[155] World Bank (2011a)

limited, alternative income sources, such as selling mats, rum and natural resources, will be affected. Consequently, when trade is most needed to provide extra income for survival, it is at most difficult. In addition, income from tourism will be affected by extreme climate events.

When food is scarce and local food prices rise, there is a risk that the price of fish does not always rises correspondingly. This was observed, for example, in October 2008. If such a situation occurs, the coastal fishing areas are worse affected since the purchasing power of the fishing communities decreases and the amount of food they can buy also decreases.[156]

The government lacks the capacity to provide an adequate economic and social safety-net due to the country's low Gross Domestic Product (GDP), a high public debt and the high level of corruption.[157] Furthermore, government support only reaches parts of the population, most notably because people without documents are excluded from the services provided by the National Institution of Social Affairs.[158] Isolation and infrastructural destruction also make it hard for humanitarian aid to reach the area.

The school system in Chinde District has been improved since 2000 but remain inadequate. In 2007 the schools were attended by approximately 37,000 students, but still nearly 11,000 children between 6 and 13 years lack studying opportunities.[159] Since 49 per cent of the population is under 15-years old,[160] this will be a large problem when the younger enter the labour market since education is one important part of building adaptive capacity towards climate change. A large majority of the entire population is illiterate: 92 per cent of the women and 65 per cent of the men. The total illiteracy rate in Chinde District is 79 per cent, which is much higher than the 52 per cent average across the Mozambican population. Another difficulty for the people in the Chinde District is that only one-third of the population, mainly men, speaks the official language Portuguese. The dominant language is Elomwe. People who do not speak Portuguese are at a disadvantage at school and on the labour market.

4.2.2 Impacts on economic security in Bulawayo

The unemployment rate in Bulawayo is estimated to 80 per cent. For those without an employment, the informal sector and urban agriculture can give an extra income. The urban agriculture, however, is dependent on access to water and is negatively affected by rationing and a ban to use municipal water to water

[156] USAID (2008)
[157] World Factbook (2011a)
[158] SETSAN (2008), p. 34
[159] INE (2008), p. 11
[160] MAE (2005), p. 10

gardens. Bulawayo has reportedly been the economically strongest city in Zimbabwe. However, drought affects the hydroelectric plants which provide Bulawayo with energy. This, in turn, reduces industrial production, exacerbating the already high rate of unemployment in Bulawayo. The intensity and frequency of droughts are expected to increase with climate change, making the problem worse. Not only will the changes in water cycles result in an uncertain energy production, the water resource itself will be unreliable for industrial use.

Droughts and extreme rainfall have also severely damaged crops, reduced harvests and affected livestock, reducing the availability of food and access to incomes. Shortage of food gives rise to increased local food price. In the city of Bulawayo, droughts particularly affect households' income levels by reducing their purchasing power when the food prices increase. 95 per cent of the population has to purchase at least part of its cereal needs.[161] However, the Zimbabwe government's Grain Marketing Board regulates prices, which, in turn, limits farmers' profits as well as their willingness to sell agricultural products on the formal market.[162] Previous droughts in Zimbabwe reduced the production of food and goods, adding to the macro-economic chaos caused by mismanagement, and increased prices and inflation.[163] In Zimbabwe, the price of food is regulated, but commerce is conducted in the informal market rather than the formal one, making governmental measures inefficient.

Zimbabwe's severe budget deficit and large public debt indicate insufficient capacity to supply economic and social safety-nets to the population. Only 4 per cent of the unemployed labour force receives labour and social protection.[164] Since 2002, millions of people in Zimbabwe have been dependent on food aid from international actors like WFP.[165]

4.3 Food security

Food security requires that food and water are available, accessible and of good standard (utilisation). These three properties are further discussed below.

The food availability in the Zambezi River Basin will be critically impacted by changes in the water cycle due to climate change. Flooding due to extreme rainfall, and droughts and heat stress due to increased temperatures, are likely to destroy crops, threaten livestock and reduce opportunities for fishing. Droughts may also dry up and exhaust existing water resources,[166] while flooding and

[161] FNC and MoHCW (2004)
[162] FAO and WFP (2008), pp. 5, 8–10, 23, 25
[163] MDP and RUAF (2007b)
[164] Ibid.
[165] Landguiden (2011)
[166] SETSAN (2008), p. 11

cyclones may pollute fresh water through, for example, saltwater intrusion, environmental hazards and bacteria from waste water.[167] Furthermore, unpredictable water cycles will make it difficult to plan the cycle of agriculture.[168] In addition, population movements due to climate change may increase population densities and lead to the impoverishment of land and other resources, which can endanger food availability.

However, increasing temperatures could also lead to benefits in terms of increased food crop production, particularly at higher altitudes where the growing season will be prolonged. Impacts of climate change will also affect food access. Destruction of infrastructure by flooding or cyclones will make it difficult to transport food, and also obstruct emergency responses and food aid.[169] The loss of rivers for transportation during droughts may have the same result. People that are not available to grow their own food are dependent on a sufficient income to buy their food requirements, creating a strong link to economic security.

The utilisation of food is also likely to be made more challenging by climate change as the availability of fresh water will be affected, already poor sanitation facilities may deteriorate further, and health care services risk being over-burdened. All these factors obstruct nutritional well-being and consequently limit the adequate utilisation of food.

4.3.1 Impacts on food security in Chinde District

As agriculture and fishing are vulnerable to climate change, the Chinde Delta region's main sources of food are affected. Crops may be destroyed due to both water scarcity (droughts) and an excess of water (floods). In the longer term, cyclones, storms and flooding that will increase with climate change may lead to increased erosion and the loss of agricultural land along the coastline. The cyclone season generally occurs with the rainy season and coincides with the main agricultural season, leading to the destruction of crops, food reserves and houses. Saltwater intrusion also risks polluting surface and subterranean water resources. Consequently, acute food shortages can emerge and vulnerability can increase.[170] The degree of food loss linked to heavy rainfall depends on which crops are cultivated. Sugar cane, that is the main crop, is to some extent resistant to flooding, but it is used as a source of income rather than food. Cassava and sweet potatoes are to some extent resistant to poor rainfall.[171]

[167] Busby et al. (2010), p. 4
[168] FAO and WFP (2005), p. 10
[169] IFRC (2010), p. 13
[170] WFP (2010), pp. 8, 72
[171] FEWS-NET (2008)

Just as food production is affected by natural disasters, incomes earned by selling crops are affected. The same is true for other livelihoods, such as fishing and the sale of rum and handicrafts, the latter since it will be reduced because of low demand under such circumstances.[172] People living in villages that are not adjacent to the river do not earn an income from fishing and do not enjoy a second cropping season. They are therefore at most risks. If local food prices rise due to decreased food production, it will affect different groups in different ways. As the poorest part of the population (25 per cent) relies on the market for half its food, increased prices will reduce access to food. The rest of the population, which cultivates crops for its own consumption and for sale, does not suffer as much and can even benefit from higher food prices. As the region is isolated and the transport infrastructure is poor during the rainy season and may be even more damaged during natural disasters, providing food aid in the area is likely to be both difficult and expensive.

If people cannot afford to purchase their food needs, wild food (roots and fruits) play a critical substitution roll, making the quality of the diet likely to drop as it has lower nutritional value.[173] The water supply is also likely to be affected by climate change as the area's main supplies of drinking water – wells and boreholes (62 per cent), lakes and rivers (32 per cent)[174] – are likely to be constrained by either drought or pollution. A lower quality of food as well as poorer access to safe water and health care will affect the capacity of households to utilise food adequately.

4.3.2 Impacts on food security in Bulawayo

In Bulawayo, the impact of climate change on food security will mainly arise from droughts and the related problems will mostly be connected to the scarcity of water resources. Agricultural production in the surrounding area will be affected, decreasing the supply of food to the city. Many urban households complement their purchased food with their own small-scale production. However, urban agricultural production will be affected by water scarcity, reducing the availability of food for households.[175] Also urban agricultural use of waste water will be affected since the amount of sewage water declines. Because of the lack of domestic food production, Zimbabwe has become a net importer of food. This caused grave complications when the country suffered from high inflation and a shortage of foreign currency.[176] This mainly affected the urban population, who constitute 30 per cent of the total population, as three-quarters of

[172] FEWS-NET (2008)
[173] Ibid.
[174] MAE (2005)
[175] MDP and RUAF (2007c)
[176] UNDP (2010)

them buy their food. It should be noted that some 60 per cent of the urban population is concentrated in Harare and Bulawayo.[177] The lack of availability and access to food means that the need for food aid is high.[178]

The impact of climate change on local food prices will aggravate the capacity of households to buy food, which is of particular concern in Bulawayo where food access for up to 95 per cent of inhabitants depend on purchasing food. During the drought of 2007, food access became difficult in Zimbabwe, particularly in urban areas, since staple food items became increasingly scarce or non-existent in the market. Most staple foods could only be found in the informal market at prices much higher than the majority of the population could afford.[179] Food can also be accessed by food aid. Zimbabwe is highly dependent on such aid today, and procedures and systems already exist for food distribution. These procedures are likely to simplify emergency food aid in time of disaster. As a city, it should be easier to import food aid to Bulawayo than it is in many rural areas.

Access to clean water is reduced during climate hazards, as water evaporates during droughts and may be polluted by floods. The water in the city is not only expensive, but also of insufficient quantity to satisfy the needs of the citizens. A system of rationing water already exists, but availability of and access to water is still a grave problem. This is likely to become an even greater challenge in the future due to climate change. The utilisation of food will also be affected by a reduction in crop variety, which will negatively affect nutrition.

4.4 Health security

Health security is achieved when threats against human health are minimised and when an appropriate health care is available to take care of people in those cases when threats cannot be avoided. Health threats and health care are further discussed below.

Climate change will exacerbate many health threats in the region. Health will be directly affected by natural disasters such as storms and cyclones, which can lead to injuries and fatalities.[180] An increase in temperature is also likely to increase the mortality rate especially among the elderly and children. More indirectly, changes in temperature, water levels and vegetation contribute to an increased prevalence of diseases.[181] During flooding, outbreaks of waterborne diseases, such as cholera and dysentery, increase as the supply of safe water and sanitation

[177] FAO and WFP (2008), pp. 7, 23
[178] WFP (2011b)
[179] USAID (2007)
[180] Smith and Vivekananda (2009)
[181] O'Brien et al. (2008), p. 19

facilities is reduced.[182] Outbreaks of epidemics are a risk, especially in areas of high population density. The prevalence of vector-borne diseases, such as malaria, increases due to stagnant water left in the wake of floods.[183] The prevalence of Malaria, which is already a grave threat to health security, will not only increase but also have worse health consequences where people are more vulnerable due to malnutrition.[184] In general, the risk of the spread of pests and diseases will be increased by climate change. HIV/AIDS is another major threat to health security that is likely to increase as an indirect effect of the impacts of climate change.[185] Displacement is one of the main factors that contribute to exposure of people to conditions where HIV is spread, and population movements might increase with climate change, as mentioned earlier. For example, the social safety-net of communities is reduced, exposing women to a higher risk of sexual exploitation and thereby increasing their risk of contracting HIV.[186] Times of crisis constrain HIV prevention activities, such as condom distribution and education, which might also increase the prevalence.[187] Rural households are generally more vulnerable than urban ones in terms of health security, as there is normally less access to safe water[188] and health services in rural areas.[189] Threats to health security are also usually greater for the poorest sections of the population, and especially women. In addition to the increased risk of HIV infection, the already grave dangers connected to childbirth in poor countries are exacerbated by poor access to health care, limited access to safe water, and forced mass movements.[190] Pregnant women and children, in particular, are more susceptible to malaria and other diseases, as their health status is already are more vulnerable.[191] Elderly people are another vulnerable group, in terms of contracting diseases and being unable to follow should households need to move, thereby losing access to caregivers and family support.[192]

As the health status of households deteriorates, their demands on the country's health care system will increase, overburdening a poor country's already scarce health care resources.[193] A collapse of the public health system is possible and a decrease in health care capacity is likely.[194] Supplies of, for example, safe water,

[182] SETSAN (2008), p. 7
[183] IFRC (2010), p. 13
[184] Onjala et al. (2006), p. 7
[185] UNDP (1994), p. 24
[186] IFRC (2010), pp. 13, 18
[187] INGC, UN and NGOs (2007), p. 9
[188] UNDP (1994), p. 24
[189] Onjala et al.(2006), p. 7
[190] UNDP (1994), p. 24
[191] O'Brien et al. (2008), p. 12
[192] O'Brien and Leichenko (2007/2008), p. 28
[193] FAO and WFP (2008)
[194] ZimVAC (2009), p. 19

and energy from hydroelectric production, medicine and personnel could all be reduced by the impacts of natural disasters. Likely infrastructural damage will also limit the ability of affected households to reach health centres and increase the need for emergency aid to reach affected areas.

4.4.1 Impacts on health security in Chinde District

The number of deaths and injuries, and the level of illness in the Chinde Delta region are likely to increase due to floods, storms and cyclones. This will directly affect health security in the area. A reduced level of economic and food security will also indirectly reduce health security since food scarcity can lead to malnutrition and reduced incomes make it harder for people to afford health care. In the Chinde Delta region, the major diseases reported are malaria, followed by diarrhoea, sexually transmitted diseases and HIV/AIDS.[195] It can be assumed that vector-borne diseases, especially malaria, will increase in the wake of floods or in stagnant water left in dehydrated areas. Other medical conditions common in the region, such as diarrhoea, are likely to increase as already poor living conditions deteriorate further. In 1997, for example, only 4 per cent of the families had toilets or latrines.[196] Higher sea temperatures will lead to increases in plankton. The cholera bacteria can live on some species of plankton, and could consequently flourish and be spread to populations living along the coast.[197] Crocodile attacks are a threat in the region that increases when the river level is low. Fishermen usually avoid fishing during these periods, but if other food and income sources are affected fishing carries on even at greater risk. As homes are flooded or destroyed and households' food and incomes are eliminated, mass movements may occur within the region, which would affect health security and increase the risk of HIV infection as well as other health problems.

The health care system in the region has been improved the last ten years but remain inadequate.[198] The district had 11 health facilities in 2005 and the health system offers one facility for every 8,300 residents (2005).[199] In addition, because the Chinde Delta region is isolated and lacks sufficient transport infrastructure, there is a risk that access to health care will be restricted even further.

[195] MAE (2005), p 10
[196] Ibid. p. 24
[197] SARDC and HBS (2010), p. 16
[198] MAE (2005), p 10
[199] Ibid. p 14, 44

4.4.2 Impacts on health security in Bulawayo

The overall health status in Zimbabwe is low. 15 per cent of the population between the age of 15 and 49 is estimated to live with HIV/AIDS and life expectancy at birth was only 48 years in 2009.[200] One-third of the total population is estimated to be undernourished.[201] In Bulawayo it can be presumed that the already low health security will be further decreased by a higher frequency of epidemics from waterborne diseases as a consequence of the impacts of climate change. Reduced access to safe water and insufficient sanitation in combination with a high density of people are factors that will increase the spread of diseases and limit the capacity to recover. Existing levels of chronic malnutrition in Bulawayo make vulnerable groups, especially children under five years of age, susceptible to various infections and diseases.[202] In times of water scarcity, sanitation and hygiene conditions become a critical challenge in Bulawayo. When water rationing is severe, many residents have to take water from unprotected wells and other unsafe sources, increasing the prevalence of waterborne diseases.

Reductions in energy supplies, as a consequence of changes in the water cycle, may limit the capacity of local hospitals and clinics when the need is high. During the 2007 drought, water scarcity together with reduced access to adequate sanitation and a collapsed health system made Zimbabweans susceptible to water-related diseases. In September 2007, outbreaks of diarrhoea and dysentery led to more than 400 people in Bulawayo being hospitalised in one week.[203]

[200] World Factbook (2011b) and World Bank (2011a)
[201] WFP (2011b)
[202] MDP and RUAF (2007b)
[203] USAID (2007)

4.5 Vulnerable systems and livelihoods

As mentioned in section 2.2, vulnerability of a society to climate change depends on three components; the *exposure* of climate hazards, the *sensitivity* of the society to such exposure, and to the *coping* or *adaptive capacity* that makes it possible to cope with the impacts in the short- or long-term. This section summarises what has already been established in sections 4.1-4.4 with regard to these three factors.

At present, the Zambezi River Basin suffers from floods, droughts and, in the coastal areas, cyclones. While flooding, unpredictable water levels and cyclones are the largest climate related problems in Chinde District; drought causes most severe impacts in Bulawayo. These problems are predicted to be exacerbated with climate change. In the future both areas will meet challenges emerging from increased mean temperatures, affecting among other things health and crops. Chinde District will also have to handle a sea level rise and salt water intrusion. The impact of climate change is a combination of the climate exposure, as described above, and the sensitivity of the system under study. Having human security in focus, we conclude that there are several systems sensitive to current and future climate that are summarised below.

Ecological systems are predicted to be affected by climate change, and the loss of biodiversity may increase. In the Chinde Delta mangroves and wetlands are put under further stress by climate change and in Bulawayo veld fires are predicted to be a larger problem when droughts become more frequent.

Water resources are scarce and will be even further insufficient in the future. In Chinde District, flooding and cyclones may pollute fresh water by, for example, saltwater intrusion and environmental hazards. In Bulawayo, fresh water might be exhausted by droughts, forcing people to take water from unsafe sources and thereby increasing the risk of waterborne diseases.

Hydroelectric production and industrial use of water in Bulawayo is threatened during periods of scarce water in the Zambezi River.

Agriculture is affected by droughts, flooding and cyclones. In the long-term, it will also be affected by the increase in mean temperature, introducing, for example, heat stress on crops. In Chinde District, long-term climate change impacts may be loss of agricultural land due to sea level rise and erosion along the coastline. Today, crops in Chinde District are threatened mainly by flooding. Urban agriculture in Bulawayo, and agriculture in the near area, is threatened by droughts. A decrease in food production affects the economic system since local food prices may increase.

Fishing is mainly carried out in the Chinde district. It is dependent on the water level, which is assumed to be more unpredictable with climate change.

Infrastructure may be affected by natural hazards. Roads in Chinde District may be destroyed by flooding and cyclones and low water levels in the rivers may make it impossible to travel on the rivers. Taken together, transports needed for food distribution and for trade purposes are difficult to perform. In Bulawayo, infrastructure such as roads and railways may be destroyed by natural hazards.

Livelihoods become uncertain during climate hazards due to the above mentioned effects. Income from agriculture and fishing will decrease. Employment in industries is threatened by a decline of hydroelectric production and trade will be limited when infrastructure is destroyed and the purchasing power is lowered.

Human health may be directly influenced by heat waves, but also indirectly by an increase in different kinds of diseases. In Chinde District it is assumed that mainly vector-borne diseases, such as malaria, will increase with climate change while in Bulawayo, outbreaks of waterborne diseases such as cholera and dysentery are likely to be more frequent. In both areas, HIV is predicted to increase, partly in connection with an increased uncoordinated migration due to climate change.

Taken together, the two first components of vulnerability, i.e. the increased exposure of climate hazards and a high sensitivity of the above systems, make the impact of climate change severe. However, the third component of vulnerability, the coping or adaptive capacity, may either mitigate or exacerbate the impacts of climate change. The coping capacity describes the ability of the society to cope with climate impacts today, while the adaptive capacity describes the capacity to adapt to a future climate over a longer-term. Both capacities depend on factors such as poverty, health status, education and governance.

In Chinde District poverty, high illiteracy, deficient infrastructure, weak government safety-nets and a low health status makes the coping capacity low. But there are also factors contributing positively to the coping capacity, such as the social pressure to offer poor people labour when flooding occurs and humanitarian aid.[204] The coping capacity in Bulawayo is also low, partly due to the same factors, such as poverty, weak government safety-nets and low health status. Other factors such as high unemployment and a recent economic crises also lower the capacity. On the positive side is the inhabitants' higher level of education, their ability to take advantages of possibilities of urban agriculture and, as for Chinde District, the presence of humanitarian aid, even if it is insufficient.

[204] WFP (2011a)

In order to reduce vulnerability to climate change, measures that influence any of the three factors mentioned above might be successful. To decrease the exposure of climate change, mitigation is necessary, but this must be dealt with by the global community. The two other possibilities are either to reduce the sensitivity of different systems (such as agriculture or infrastructure) or to increase the capacity to handle the impacts of climate change when it occurs, by enhancing the coping capacity. Both these possibilities are usually brought together as adaptation measures, which are further discussed below.

4.6 On-going and suggested adaptation

Communities within the basin have always been at risk from climate hazards and have continually found different ways to adapt. Examples of current adaptation measures that are taken on an individual basis in the Zambezi River Basin include accumulating food surpluses, hedging risks by, for example, diversifying livelihood income sources or by diversifying crops, using drought-resistant seeds, harvesting rainfall, adopting irrigation methods, relocating settlements temporarily or permanently, using kinship networks, and using public sector assistance such as education, development projects and credit services.[205] Near the Zambezi River, people have plots on high ground for use when there is a lot of rain, and on low ground for when there is little rain.[206] These strategies constitute a base that could be further developed and strengthened within communities. Other coping strategies in Chinde District include increased levels of fishing and consumption of wild flowers. When flooding occurs, there is social pressure on the better-off to offer labour as social support.[207]

At district and national level many initiatives have been taken to adapt and thereby reduce vulnerability. Mozambique has a relatively well-developed disaster preparedness plan at the district level together with evacuation procedures and broad community preparedness plans. Early-warning systems are also in place for cyclones, flooding and droughts. [208] At the beginning of the century, after Chinde District had been hit by floods and above normal levels of rainfall, followed by years of drought and irregular rainfall, the district government took initiatives to mitigate food insecurity. This was done by, for example, distributing seeds and agricultural tools to flood victims, repairing drainage ditches in the lower district, and promoting sweet potato orange pulp.[209] Cassava, which is mainly grown in the north of Mozambique, has been introduced by the government, together with sweet potatoes, as drought-resistant

[205] WFP (2011a)p. 21
[206] SARDC and HBS (2010), p. 22
[207] FEWS-NET (2008)
[208] SARDC and HBS (2010), p. 22
[209] MAE (2005), p. 31

crops in other parts of the country.[210] The Chinde district has also been helped by external resources for adaptation. For example USAID/OFDA have funded a two-year River Value programme in Chinde (starting 2009/10), which among other things, work with local disaster risk management committees.[211]

In Bulawayo, the drought of 1990–92, when the city almost ran dry, has triggered many water saving measures. These include public campaigns for water conservation, hosepipe bans, water rationing, aquifer projects, water reuse, and extraction of dead water from supply dams. In the City of Bulawayo, most treatment plants nowadays practice wastewater treatment.[212] Due to the city council's strategy, urban agriculture and growing gum trees at gum plantations have increased to improve livelihoods and to reduce food and economic insecurity.[213] However, current water supplies are not sufficient for urban agriculture, especially when future population will increase and make additional demands on even scarcer water resources. The need for new adaptation solutions is therefore crucial.[214] Such solutions could consist of harvesting from rooftops, sand abstraction from peri-urban rivers, additional boreholes and a larger amount of reclaimed water. The reuse of properly treated sewage water is one of the prime resources that can supplement urban water supplies.[215] There are also several water supply projects planned, such as the Mtshabezi pipeline, the Gwayi Shangani pipeline and the Nyamandlovu Aquifer.[216] Among technical solutions, many water-saving practices can be implemented for crops, such as drip, sprinkler and alternate furrow irrigation.[217] These practices are particularly useful for thirsty crops such as sugar cane, which is cultivated using irrigation in both Mozambique and Zimbabwe, and wheat, which is cultivated using irrigation in Zimbabwe.[218]

A challenge in both areas is to acquire, and to disseminate, new relevant knowledge about how to understand the new climate. A study of Malawi and Zimbabwe shows that farmers are able to forecast seasonal weather from knowledge of weather systems, such as rainfall, thunderstorms and sunshine.[219] Elderly farmers can formulate hypotheses about seasonal rainfall from observed natural phenomena and act according to those observations. With climate change, however, this knowledge could lead farmers to draw the wrong conclusions.

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[210] Swain et al. (2011), p. 85
[211] See the Zambezi River Basin DRR Programs on www.usaid.gov
[212] Sibanda (2002)
[213] MDP and RUAF (2007a)
[214] MDP and RUAF (2007c)
[215] Sibanda (2002).
[216] Ibid.
[217] WWF (2003)
[218] Ibid. p 10.
[219] SARDC and HBS (2010), p 21.

5 Case-specific relations between climate change, human insecurity and possible conflict

In the report *Climate Change and the Risk of Violent Conflicts in Southern Africa*, Swain et al. identified that polarised social identities, weak institutions and bad governance can explain *why* certain societies are more vulnerable to conflict linked to climate change.

In this chapter, we explore *how* this link could be manifested. Drawing on the human security challenges (increasing human vulnerabilities) identified in chapter 4, and linking back to the theoretical discussion in section 2.1.2, such challenges could be termed threat multipliers in the discourse of linking climate change and conflict. This chapter will seek to identify examples of uncoordinated coping responses to such threat multipliers, which could ultimately pose security threats unless managed responsibly.

As the violent and insecure past of the studied regions suggest, climate change has not been the dominant factor explaining the challenges to human security. Instead, the regional vulnerability has been fundamentally politically driven, including positioning around historical, identity and socio-economic relations. Hence, the attempt in this chapter to draw out potential lines of tensions associated with climate change induced human security challenges, should not be read as a suggestion that climate change would become the determining source of conflict. Instead, it remains a threat multiplier interacting with other, fundamentally political causes of conflict.

5.1 Possible lines of tension in Chinde District

As noted in section 4.2.1, due to the geographic location of the city of Chinde and the Zambezia province, it is at especially high risk of becoming affected by flooding and cyclones as climate change increases the intensity and frequency of such events. Apart from the effects noted on the previously mentioned dimensions of human security above, floods already pose a great challenge to human security at the personal and community level, by displacing millions of people. Floods in Mozambique have repeatedly generated huge flows of displaced persons, widely overstretching local resources.[220] In the flooding of 2000 IPCC estimates that 2,000,000 Mozambicans were displaced or seriously affected. Infrastructure, health services, water treatment facilities and food

[220] Swain et al. (2011), pp. 49, 95–101

production were lost[221]. According to Swain et al. the number of *displaced* persons in the Zambezi River delta alone was 200,000. In 2007, another great flooding in the Zambezi River displaced 95,000 persons and approximately 520,000 persons faced starvation as they lost access to livelihoods, could not afford food or be reached by relief efforts.[222] Displacement also risks dismantling those social and communal mechanisms that otherwise would have made it possible to ease individual insecurity, such as economic support from relatives or the community.

Although displacement itself does not cause conflict, it stresses already sensitive issues such as competition over resources, access to immediate relief and long-term development of adaptive capacity and security. Access to such services and security are already highly politicised in the Mozambican context and the regime's (in)ability or (un)willingness to provide such services in response to displacements could be a determining factor for whether this uncoordinated response to climate change develops into heightened tensions or conflict, for example between political fractions of FRELIMO-RENAMO and along a north-south divide.

Swain et al. note that many of the farmers in the Zambezia province are ex-fighters in the civil war. If they lose their income they may cope with their frustration through violence.[223] At least they are at risk of becoming more vulnerable for discourses advocating violent response to their situation and low adaptive capacity.

As noted in section 4.2.1 and 4.3.1, agricultural crops and land may be destroyed through drought or cyclones or in the long run be permanently lost through erosion due to sea level rise.[224] In the short-term, this would increase food prices and make Chinde more dependent on food aid, as it faces acute food shortages. However, as this district is more difficult to access than other parts of the country, it could affect the availability of such aid. Recalling the polarised political context noted in chapter 3.2.1, this in turn could lead to allegations of exclusion from such assistance based on political or identity basis. In fact, as seen in Section 4.2.1, people are already being excluded from government assistance in Mozambique based on lack of appropriate identity documents. Depending on how access to national identity documentation is handled and perceived, the issue of inclusion and exclusion from citizenship rights could turn more politically tense as access to government assistance grows in importance. Increases in food prices have also led to "uncoordinated responses" of popular unrest, including violent protests and clashes between the government and the

[221] ICPP (2001) p.515
[222] Swain et al. (2011) p. 96
[223] Ibid. p. 103
[224] WFP (2010), pp.8-72

exposed population.[225] In 2010, for example, when the food shortage and prices were increased, protesters and security forces clashed violently.[226] As such, the response to unrest from the regime is often a direct threat to its citizens' personal and political security.

As seen in section 4.3.2, climate change is expected to bring about further stress on an already under-developed health system in Chinde District, through cholera, dysentery and malaria, especially after flooding or other extreme stresses on the health- and fresh water infrastructure. A failure to address this could also lead to an intensified discourse of exclusion from benefiting from central government. Indeed, according to Swain et al., the cholera outbreaks in Zambezia 2010 lead to riots and killings due to allegations against the government efforts. The government was accused by the opposition of consciously spreading the disease instead of fighting it.[227]

In the long-term, the permanent loss of agricultural land highlights issues of land and resource distribution and economic security. Land distribution, access to livelihood and affordable food is already highly politicised given the history of Mozambique. The early FRELIMO Marxist-Leninist efforts to collectivize agricultural production were managed through a deprivation of power from traditional leaders and systems in favour of central government officials. This evoked an increased support for RENAMO among the traditional leaders and actors, formerly in power. It also highlighted the conflict between rural and urban areas.[228] Since the initial socialization of means of production FRELIMO has instead sought to privatize operations. Yet this has also meant an increased level of power centralization with the party elite whom, as a group, gained control of many facilities from the earlier "communal owners".[229] Such control could become more contentious as the overall productivity falls due to climate change-induced shocks such as floods and droughts or by the long term erosion and saltwater intrusion.

Given the patronage system between the ruling elites and the population, noted in Mozambique more generally in section 3.2.1, the popular frustration over lack of access to safe livelihood, affordable food and other forms of human insecurities may also threaten the posture of the elites in the patronage of Mozambique. As impacts of climate change effects the possibility to maintain food security, the consequences of exclusion from patronage is exacerbated. The unequal system of power and distribution through the patronage network could therefore, when combined with greater pressure from below, have the elites to resort to further violence in order to maintain its position. But high food prices may also enrich

[225] Swain et al. (2011) p.96
[226] Ibid. p. 96
[227] Ibid. pp. 93-94
[228] Ibid. p.100
[229] Hanlon et al. (2010) pp.3-4

those who own and distribute land or intact products. Therefore, the centralization of wealth and power over agricultural production and distribution with the FRELIMO elites is a common feature of the opposition's argumentation and criticism.[230] Increased threats to food- and economic security, as posed by climate related stresses, through both long- and short-term consequences, can hence be argued to correlate with a risk for further political violence.

5.2 Possible lines of tension in Bulawayo

The case of Bulawayo (along with Zimbabwe more generally) is quite different from that of Chinde and Mozambique as many of its socioeconomic indicators are at a record low due to political and economic mismanagement over the past decade. Hence, the expectation would be that over a medium to long-term Zimbabwe will improve its economic and food security, regardless of the negative effects expected from climate change. However, current tensions around human security factors that are affected, and the way society is handling them bears witness to the tensions inherent in some of the factors expected to experience a *slower rate of recovery* than could be expected in the absence of climate change.

Countries coming out of war or other forms of turmoil can experience challenges in managing the expectations of the population, as they are demanding peace dividends.[231] In such circumstances a slower rate of recovery could in itself be contentious in situations.

Turning to economic security, a number of negative impacts from climate change could lead to a slower rate of recovery and resultant expectation gaps which could be interpreted through the lens of the conflict narrative of Zimbabwe, including the grievances felt by the Ndebele population which dominates Bulawayo, as well as its historical links to the political opponents to ZANU-PF as set out in section 3.3.1. For example, with unemployment rates at around 80 per cent, it is unlikely that climate change would exacerbate these further. Instead, economic recovery and thereby growth in employment, which is expected with a more conducive political environment and sounder macro-economic management, could be negatively affected. Even under generally positive trends, a slowing down of recovery could further aggravate expectation gaps that could follow an improvement in the political climate. Under such conditions, the perception among the Ndebele minority, that the majority Shona population is favoured in public sector jobs, could lead to heightened tensions around this issue. Similar reasoning would apply to industrial policy and health care facilities, where there are already perceptions that Bulawayo is being

[230] Swain et al. (2011) p. 101
[231] Call et al. (2007) pp. ix, 9, 103

neglected by government expenditure, either based on ethnic discrimination or because of being seen as a province that is supportive of the political opponents to ZANU-PF and Robert Mugabe. The issue of health care could also become more contentious with an increase in the spread of e.g. waterborne diseases.

As noted in section 4.3.2, Bulawayo is expected to experience intensified water scarcity due to climate change. The Zimbabwean southlands, Matabeleland and its regional capital Bulawayo, have considerably less access to steady water supply than northern Zimbabwe. As water shortages intensify, failure to improve water access, whether through maintenance of existing or investments in new infrastructure, could easily be interpreted through the conflictive discourse of Matabeleland being excluded from equal access to land, services, resources, infrastructure, political influence and social status.[232] Such perceptions could negatively affect possible efforts at reconciliation and national healing.

Given that national land productivity is projected to be negatively affected by climate change, the report has pointed out the increasing pressure this may have on urban farming in places like Bulawayo. While Zimbabwean food production would be expected to increase as the political and macroeconomic climate improves, the recovery would again be negatively affected by climate change. Access to land has already proven to be a critical ingredient in Zimbabwe's contemporary political conflict narrative. Assuming that the general availability of productive land is reduced, one would expect this tension to increase.

With expected food shortages due to climate change, it is worth noting that the Zimbabwean population has endured a number of years of wide spread food shortages without resorting to violence. Nevertheless, food riots have occurred, even being expressed through members of the military rioting in the central business district. If the improvement of future availability and food access of food is negatively affected by climate change as projected in section 4.2.2, such riots could remerge.

The regime's identification of Matabeleland and its regional capital, Bulawayo, as oppositional strongholds may put the region's inhabitants at specific risk at becoming further subjected to violence and authoritative measures and exclusion from patron-client networks. Challenges from climate change coupled with the mechanisms of repression and high vulnerability therefore adds stress on local society. As such, a connection between climate change, vulnerability, human security and possible tension is the level of violence exercised by regime to uphold unequal distribution and access to power and livelihoods under conditions of increasing scarcity caused by climate change.

Finally, just as migration flows within and out of Zimbabwe are expected to decrease once the political and economic management of the country improves,

[232] Swain (2011) p .53

such flows are likely to continue and be positively affected by climate change. The number of internally displaced persons in Zimbabwe is according to UNHCR highly uncertain yet the planning assessment for future projects is for 1,000,000 individuals.[233] At both the community- and national levels, Zimbabwe has been unable to offer durable solutions to displaced populations. This has meant that large populations are unable to access land in the rural areas or formal housing in urban settings. There are repeated accounts of displaced persons being re-evicted from rural or peri-urban settings and at a more extreme form over half a million people were displaced from urban settings across the country through the centrally orchestrated Operation Murambatsvina ("Clear the filth")[234]. Drawing from recent experience, there is therefore little to suggest that internal migration will be managed in a responsible fashion either by local, provincial or national authorities in Zimbabwe. Perhaps equally worrisome is the uncoordinated management of migrants in the region. In South Africa, for example, UNHCR estimates the number of Zimbabwean asylum seekers to be approximately 261,000 individuals[235], whereas the total and probably much larger number of Zimbabweans in South Africa, including irregular migrants, is much harder to assess. Human Rights Watch estimated in 2008 that 1,500,000 Zimbabweans migrated to South Africa since 2005, many of those in the aftermath of the infamous operation Murambatsvina.[236] Once in neighbouring countries, migrants are generally highly, and continuously, vulnerable and their presence there controversial.[237] During 2008, mass violence occurred in different parts of South Africa leaving 60 dead immigrants.[238]

5.3 Findings: Possible lines of tension derived from climate change-induced human insecurity

The chapter set out to explore *how* climate change-induced human security vulnerabilities could be linked to conflict. After having identified possible tensions associated with these vulnerabilities in the two cases, a pattern emerges which includes a) uncoordinated management of migration flows, b) politicisation of access to resources and c) an increasing repressiveness of government responses as its patronage systems of control are both undermined

[233] UNHCR Zimbabwe operation profile (2011)
[234] HRW (2005) p.4
[235] UNHCR South African operation profile (2011)
[236] HRW (2008) p.1
[237] Ibid pp.7-8
[238] UNHCR News stories (2010), UNHCR (2010) Refuge protection and international immigration, pp.13

and further questioned as resources become scarcer. These three links are elaborated below:

a) Climate-related migration can be a significant tension risk as well as coping strategy for vulnerable individuals.[239] Climate change can force people to migrate or relocate through sudden disruptions such as storms or flooding or through gradual processes such as deteriorating livelihoods or environmental degradation.[240] Such migration flows tend to steer towards already densely populated regions, along already established paths.[241] If these regions already suffer from high vulnerability, such migration flows may decrease society's ability to peacefully disarm tension linked to competition over resources or identity issues.[242] This is particularly the case in regions or communities where the capacity to manage migration is lacking.

b) When agricultural resources, including water, are decreased to levels where they cease to be inclusive and providing livelihood for its traditional users, competition over resources and basic commodities may result in competitive tension or costs beyond the reach of the most vulnerable. As access to resources are already politicised in both countries and climate change is expected to increase the scarcity of arable land and water, it could exacerbate the politicisation of access.

c) Mozambique and Zimbabwe have a history of authoritative rule and one-party dominance reliant on patron-client system to maintain this dominance. The same political system of patron-client access to resources leads to exclusion of non-clients and the system relies on an ability to be upheld with repressive measures if put in question. Through climate change the availability of productive resources may decrease, hence exaggerating the consequences of being excluded from patron-client systems. In such a political context climate change may enhance or provoke new tensions between patrons and the non-client individuals or groups. One would equally expect that this would be accompanied by the employment of authoritative means to uphold the system against even more vulnerable and frustrated non-client groups.[243]

[239] International Alert (2009), p 9
[240] Accord (2011) pp.6-7
[241] Ibid. p. 7
[242] Accord (2011) p. 7
[243] Raliegh (2010) p. 77

6 Concluding discussion

This report forms part of a partnership between Uppsala University, Global Crisis Solutions and the Swedish Defence Research Agency. The overall aim of the programme is to enhance the ability to prevent and resolve conflicts linked to climate change and natural resources in Southern Africa.

The first report in from the programme, *Climate Change and the Risk of Violent Conflicts in Southern Africa*, singled out the two areas, the Zambezia Province in Mozambique and Bulawayo/ Matabeleland-North in Zimbabwe, as the most vulnerable to climate change-related conflict in the Zambezi River Basin. It also highlighted three factors making societies particularly prone to resorting to conflict when faced by threat multipliers brought about by climate change. The three factors, which explain *why* certain societies are vulnerable included: bad leaders, polarised social identities and weak institutions.

This report aimed at improving the understanding of local societies' vulnerability to climate change and how these vulnerabilities may exacerbate lines of tension on a local level. This has been broken down to first give a detailed account of the specific human vulnerabilities associated with climate change of the two areas under study and then account for *how* these could potentially generate conflict.

In terms of human vulnerabilities, this report concludes that **present human security in the two studied areas is low and that climate change will undermine it further**. Natural hazards will expose people to sudden loss of crops, agricultural land and water resources. A gradually changing climate - with regard to temperature and sea level rise - will give the same result but a longer term. This means that **one would expect both sudden downturns and a chronic decrease in human security as a consequence of climate change**. The most direct impact of climate change will be on the environment. Ecological system, including agricultural land, natural resources and biodiversity are affected and this will, in turn, impact the economic, food and health security. Vulnerability, interpreted as human insecurity, is as a consequence high in the two areas.

The report identifies water resources, hydroelectric production, agriculture, fishing, infrastructure, livelihoods, and human health as specifically sensitive to climate change in the two studied areas. Due to poverty, insufficient education, weak government safety-nets and a low overall health status, **the capacity to cope with climate change impact in the short-term is low. So is the adaptation capacity in the long-term, further exacerbating the vulnerability to climate change**. To overcome vulnerability adaptation is necessary. There are already adaptation measures implemented to lower the vulnerability, but there is an urgent need for further adaptation to be initiated. Such measures must be taken on both local and national level and must include both technical and

organisational measures. An important task is also to acquire, and to disseminate, new relevant knowledge about the local climate change impacts.

As noted, the report also set out to explore ***how*** **climate change-induced human insecurity could be linked to conflict**. After having identified possible tensions associated with these vulnerabilities in the two cases, a pattern emerges which **includes uncoordinated management of migration flows**, **politicisation of access to services and resources** as well as **an increasing repressiveness of government responses as its patronage systems of control are both undermined and further questioned as resources become scarcer**.

As the programme also seeks to further local capacities to prevent conflict, the findings of the report should inform such efforts. One way of enhancing such efforts is by drawing on its findings for early-warning systems. Indeed, in the outset of the report it was established that exploring climate change and conflict through the lens of human security would enable an "earlier warning". After having studied how human security challenges could link to conflict, a starting point would be to have **dual systems of early warning,** one focusing on **indicators related to aspects of human security such as environmental, economic, food and health issues**. The second system would focus on the tensions that emerge around those human securities. Drawing on this study, the issue of how human insecurity link to conflict would point towards **early-warning systems sensitive to uncoordinated migration patterns, politicisation of access to resources and an increasing repressiveness of government responses**.

The programme focuses on strengthening the conflict prevention capacity of local-level civil society organisations, which should be well placed for monitoring the type of manifestations listed above and engage local stakeholders for de-conflicting issues such as population movements, access to services and resources or repressive means of upholding patron-client systems. However, in order to enhance their impact, **civil society organizations should also seek to engage local, national or regional conflict management structures**. Beyond obvious authorities involved in e.g. access to land, dispute settlement and promotion of transparent governance, specific early warning structures should also be engaged. In this regard, **civil society organizations could explore how they can engage the national early warning centres envisaged within the structure of the Regional Early Warning System** of the Southern African Development Community (SADC) based in Gaborone. However, in the absence of clear input channels for civil-society organizations to this early-warning system, such organizations may also want to consider developing national and

regional early warning civil-society networks to enhance their impact on policy makers who could engage in early response to the warning signals identified.[244]

[244] When comparing regional early-warning systems on the continent, ECOWAS is more inclusive of civil society organizations than SADC, as the former has formally included civil society organizations input into the regional early-warning system. Beyond this, the West African region is host to a regional civil society network for early warning.

Abbreviations

ACCORD, The African Centre for the Constructive Resolution of Disputes

CSIR, Council for Scientific and Industrial Research, South Africa

DRC, Democratic Republic of the Congo

EEPSEA, Economy and Environment Program for Southeast Asia

FAO, Food and Agriculture of the United Nations

FEWS-NET, Famine Early Warning Systems Network

FNC, Food and Nutrition Council

FOI, Swedish Defence Research Institute

FRELIMO, The Liberation Front of Mozambique

GDP, Gross Domestic Product

HBS, Heinrich Böll Stiftung

IFPRI, International Food Policy Research Institute

IFRC, International Federation of Red Cross and Red Crescent Societies

INE, Instituto Nacional de Estatística

INGC, National Institute for Disaster Management, Mozambique

IPCC, Intergovernmental Panel on Climate Change

MAE, Minesterio da Administarcao Estatal, Republica de Mocambique

MDC, Movement for Democratic Change

MDP, Municipal Development Partnership

MDM, Mozambique Democratic Movement

MoHCW, Ministry of Health and Child Welfare, Zimbabwe

PPDD, Party for Peace, Democracy and Development

RENAMO, Mozambique National Resistance

RUAF, Resource centres on Urban Agriculture and Food security

SADC, Southern Africa Development Community

SADC-WD, Southern Africa Development Community – Water Division

SARDC, Southern African Research and Documentation Centre

SETSAN, Secretariado Técnico de Segurança Alimentar e Nutrição

UN, United Nations General Assembly

UNDP, United Nations Development Program

UNHCR, UN Refugee Agency

USAID, United States Agency for International Development

UN, United Nations

WBGU, German Advisory Council on Global Change

WFP, World Food Programme

WWF, WWF–World Wide Fund For Nature

ZANU, Zimbabwe African National Union

ZANU-PF, Zimbabwe African National Union – Patriotic Front

ZAPU, Zimbabwe African Peoples Union

ZimVAC, Zimbabwe Vulnerability Assessment Committee

ZRA, Zambezi River Authority

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