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Sustainable development, disaster-risk reduction and governance : assessing climate change adaptation challenges facing South Africa

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CHAPTER 1

INTRODUCTION

1.1 Background

Recent climate change assessments for Africa show that the continent is one of the most vulnerable to climate change (IPCC, 2007a). Many of the current climate change projections provide long-term scenarios (e.g. 50 years into the future) that are far beyond that in which current policy makers usually operate. According to Baethgen (2004), such a lengthy time frame creates a misconception that 'adapting' to climate change is not urgent and as such warrants low priority when compared to other pressing problems, e.g. poverty reduction and development. Notwithstanding the need for improved policy making to better respond to climate stress in the future, much can be gained from an enhanced understanding of current climate variability and extremes (e.g. periods of drought). Such cases provide useful 'test cases' against which one can examine how successful and indeed how sustainable current risk-reduction interventions are for reducing risks and vulnerabilities to such climate hazards.

Policy responses in the fields of climate change adaptation, disaster-risk reduction and sustainable development are complicated by varying approaches and paradigms (e.g. short-term climate risks versus longer-term climate changes etc). By exploring in depth these interlinked fields of intervention and risk management, this thesis explores and examines what added value there may be in identifying synergies and linkages between current risk management for one climate hazard namely, drought.

Currently, in certain areas of South Africa (e.g. the Eastern Cape), 'double exposure' (Leichenko and O'Brien, 2008) to climate stress events such as drought on the one hand, and underlying vulnerabilities exacerbated by poor development practices and interventions on the other hand, are imposing severe losses and hardships. Such situations merit urgent consideration particularly where these link to climate change policies, disaster-risk reduction and sustainable development policies (Leichenko and O'Brien, 2008; Lemos and Tompkins, 2008). The devastation and loss of livelihoods associated with drought, usually triggered by climate variability, provides some evidence of costs and requirements of suitable risk-reduction and adaptation measures (Ribot, 2009, Vernon, 2008; Boko, *et al.*, 2007).

South Africa is already heavily committed to reducing poverty and ensuring enhanced development in several sectors through previous and current policy initiatives such as the Reconstruction and Development Program (RDP); Growth, Employment and Redistribution (GEAR) and Accelerated and Shared Growth Initiative of South Africa (ASGISA). The country also boasts one of the world's best disaster management policies and is currently putting considerable efforts into developing a National Climate Change Response policy (DEA, 2010). Given these multiple efforts South Africa should be able to better withstand the stresses associated with periods of climate variation and possible climate change in the future.

The key questions facing countries such as South Africa, which are trying to ensure effective and resilient societies to various changes, including climate change, are: First, given the plethora of policy efforts and other commitments, how and why do parts of the country currently still experience notable losses in response to periods of severe climate stress in the ways that they do?

Secondly, can ‘one do more with less’, i.e. can one leverage off existing policy and experience with climate events, overall sustainable development and poverty reduction to ensure better preparedness and resilience to such extreme climate stresses in the future?

In the study presented here, the linkages, connections and disconnections between disaster-risk reduction, sustainable development and institutional governance exposed during actual cases of drought are explored in an attempt to grapple with the questions highlighted above. The lessons that emerge during such periods of extreme climate stress, it is argued in this thesis, may provide useful guidance for future drought occurrences that some suggest, may become a more regular feature in the future given climate change (IPCC, 2007b). In the absence of an implementable climate change adaptation policy, in South Africa, the thesis aims to show what benefits, if any, there may be gleaned from examining existing policies and experiences when confronting climate stresses, e.g. drought, particularly current disaster-risk reduction policy implementation.

1.2 Research Rationale

First, a brief research rationale and framework for this research is provided below, that also resonates with the disaster-risk reduction literature. Currently, it seems disaster-risk reduction, sustainable development; climate change adaptation and governance are viewed exclusively from each other. Some theoretical debates (O’Brien *et al.,* 2008; Venton and La Trobe, 2008; Schneider *et al.,* 2007, Yohe *et al.,* 2007) suggest that successful, long-term climate change adaptation can only be accomplished if linkages between these concepts, and practices, where relevant, are recognized in development policies. Coupled to this emerging notion, there is also a need to assess the role of governance institutions and the institutional barriers of governance, where possible, that

may retard or pose a threat and or facilitate long-term sustainable adaptation (Folke *et al.*, 2005; Adger, 2006; Turner *et al.*, 2003). Over the past decades, the study of climate change has tended to focus on the identification of potential impacts of climate change on a range of economic and natural sectors. According to Klein (2004), this type of research has provided answers to the question "*climate change, so what*"? More recently, a shift in research exploring and answering the question, "*climate change, what to do*" has emerged? A key shift has thus been an approach that extends the focus from merely 'coping' with climate stresses to trying to promote more resilient responses to climate stress periods into the future (e.g. adaptive-risk management approaches) (Adger *et al.*, 2004; Schipper and Pelling, 2006).

A similar shift in perception of risk has also occurred in the disaster-risk reduction community. The focus in disaster-risk, for example, is on a proactive approach to disaster-risk rather than only on a reactive response, with a strong emphasis on understanding underlying drivers of vulnerability in a given risk. The links between climate change adaptation, disaster-risk reduction and development practice are tight and beg further assessment, especially when applied on the ground. As will be shown in Chapter 3, there are, however, also a number of differences between the concepts used by climate change adaptation and disaster-risk reduction communities. Notwithstanding these differences there are also a range of areas of convergence between these two communities, and that being the case, there is a great opportunity for teasing out potential synergies between the approaches used. Both disaster-risk reduction and climate change adaptation approaches, for example, usually take a risk-management approach particularly when addressing extreme events (O'Brien *et al.*, 2008; Venton and La Trobe, 2008; Sperling and Szekely, 2005). Rather than creating or perpetuating contexts for disaster, it is possible to use

disaster-risk reduction and adaptation strategies to create a context that reduces vulnerability and increases resilience of communities to these natural events (ISDR, 2008; Few *et al.*, 2006; Schipper and Pelling, 2006).

Although the relationship between climate change adaptation and disaster-risk reduction is increasingly recognized by researchers, policy makers and practitioners within both communities, the two communities have yet to develop coordinated efforts towards reducing climate change risks and vulnerability (Venton and La Trobe, 2008; Schneider *et al.*, 2007; Few *et al.*, 2006). Similarly, attempts to promote sustainable development share common goals with climate change adaptation and disaster-risk reduction. Already, there is a body of growing literature (e.g. Yohe *et al.*, 2007; Folke, 2006; Munasinghe, 2001) that presents arguments about promoting sustainability that includes reducing risk and vulnerability and at the same time promoting adaptive capacity to climate change and variability. The integration of climate change adaptation, disaster-risk reduction and development is therefore essential for diminishing the impacts of natural hazards and improving the sustainability of development processes.

Adapting to climate change has become important as societies attempt to respond to a myriad of complex challenges including HIV/AIDS and climate variability (Adger *et al.*, 2006; Sperling and Szekely, 2005; Adger *et al.*, 2004). Climate change adaptation includes all measures aimed at reducing the negative impacts resulting from climate change as well as the identification of new opportunities and benefits and has the potential to reduce risk to many potential impacts of natural hazards (Schneider *et al.*, 2007; Sperling and Szekely, 2005). The starting point for adaptation measures, and also disaster-risk reduction responses, is to understand the existing vulnerability of

communities and sectors to climate variability and extremes and various climatic hazards. Improving the capacity of communities to deal with current and future climatic changes, can then be adjusted to further future changes to vulnerability (Ribot, 2009; Adger, 2006; Kasperson *et al*., 2005). The challenge faced by many regions, however, is the technical, financial and institutional capacity and the actual planning of effective adaptation, especially in developing countries.

Climate change, by its very nature, will thus have winners and losers. Changing climate conditions will strongly increase the sensitivities of systems to climate stresses including capacities to cope and adapt (Leichenko and O' Brien, 2008; IPCC, 2007a). These effects will moreover, also vary for different places and populations. Societies are diverse and complex and thus some may be more vulnerable while others may be more robust and resilient. Managing these consequences therefore, also requires responsive governance at the appropriate subsidiary level (Adger, 2001; Leichenko and O'Brien, 2002; Baethgen, 2004; Vogel, 2004). Both vulnerability and climate change adaptation, moreover, also have serious implications for governance. According to Adger (2006), vulnerable people and vulnerable places are often excluded from decision making and from access to power and resources. The more vulnerable the society is to stresses, the more diverse the risks and effects can be when climate-related disasters strike (Adger *et al*., 2006; Mgquba and Vogel, 2004; Vogel, 2004).

The understanding of these differential effects is important in that the occurrence and impacts of disasters can only be understood and reduced if there is an improved understanding of the various natural processes causing them, as well as the socio-economic and environmental contexts underpinning these disasters. On the one hand, policy interventions to reduce vulnerability need to

be able to recognize the underlying cause of vulnerability and to redress such marginalisation. On the other hand, Schipper and Pelling (2006) argue, that governance, including national and local development policy can lead to greater disaster-risk and vulnerability through a variety of mechanisms, including amongst others, privatisation and liberalisation that have pushed people into poverty.

More research is therefore needed to understand the relationships and linkages between disaster-risk reduction, development policy and climate change adaptation, synergies and tradeoffs, particularly in a context where institutional and developmental capacities are strained, such as in South Africa. One way to possibly better understand such inter-linkages and tradeoffs is to also track costs and economic assets associated with action taken when a hazard such as a drought occurs in a particular setting, including how projects requiring financial assistance are prioritised and carried through, how recipients are identified and targeted? According to Yohe *et al.* (2007), climate change will result in net costs into the future and these costs are likely to grow substantially over time. The need for the understanding of costs, for the purposes of this thesis, is important because costs related to measures to reduce vulnerability begin to give some ideas of the financial and institutional demands that may be required in designing effective adaptation approaches.

Such costs cannot, however, be regarded as 'adaptation costs', because they only give an assessment of first order, costs and do not factor in those costs that may be additional costs required for effective adaptation and hence, the calculation of any detailed adaptation costs is beyond the scope of this thesis. As Parry *et al*. (2009) show, there is a scarcity of information

regarding the magnitude of future potential impacts and even fewer assessments on the costs of avoiding these impacts. Any estimates that exist now are likely to be substantial underestimates of adaptation costs for the future. The calculation of adaptation costs furthermore, is not an easy undertaking because it would have to be a study of full costs of avoiding all damage related to future impacts, including costs related to the removal of the current adaptation deficit (Parry *et al*., 2009; Vernon, 2008).

Given the complexity of the interacting themes required for this research (see for example Chapter 3) where some of the terms and ideas used in the emerging discourse on climate change adaptation are presented in more detail, the need arises for a neat and tight framework that can assist in probing and interrogating the 'messiness' of the landscape. One such overarching framework or approach (Figure 1.1), that is relied on heavily in the organization of this work, is that provided by Schipper and Pelling (2006). In this framework Schipper and Pelling (2006) explore and summarise the relationships between climate change, disaster-risk management and national development policy and how to further integrate these three spheres of influence. The framework provides examples of pathways that connect each realm to other spheres both directly and indirectly.

Where disaster-risk management is effective, for example, institutional structures and management tools to respond to weather-related shocks can form the backbone of local and national adaptation strategies. The authors do, however, take recognition of the fact that this figure is based on the simplifying assumption that relationships are linear but in reality this is not the case. This framework further reiterates what the Hyogo Framework of Action (2005) also

emphasizes; that both disaster-risk reduction and climate change adaptation can learn from and strengthen each other by consolidating efforts to reduce effectively the risks posed by climate change and natural hazards, which will in turn support sustainable development.

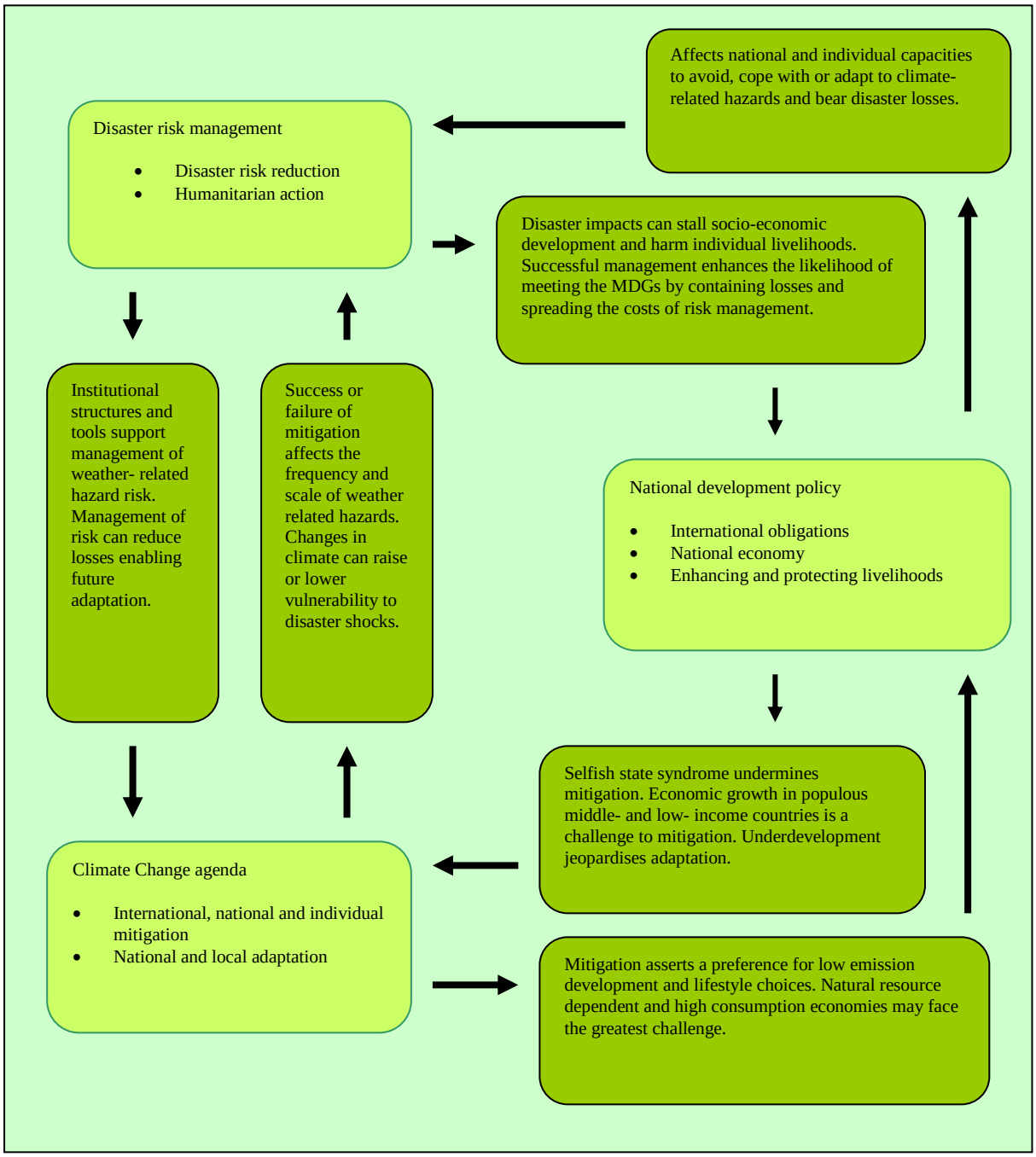


Figure 1.1: Climate change, disaster-risk management and national development policy (Source: Schipper and Pelling, 2006)

Using this framework (Figure 1.1) the integration of the four areas of concern in this thesis are examined namely disaster-risk reduction, climate change adaptation, sustainable development and governance. Climate change adaptation may require, for example, the re-shaping and re-designing of development and social and economic practices to respond effectively to new or anticipated environmental changes (Dodman and Satterthwaite, 2008; Leichenko and O'Brien, 2008; Venton and La Trobe, 2008). It is recognised, as illustrated in Figure 1.1 that disasters triggered by natural hazards are often a consequence of development failure as much as failed development is a consequence of disasters (Schipper and Pelling, 2006). By foregrounding the interactions and possible outcomes of various interactions (e.g. disaster-risk efforts, national policy and the climate change agenda) Schipper and Pelling's (2006) framework enables one to begin get some idea of the synergies, bottlenecks and various feedback and feed forward loops that are and can be used to reduce vulnerability and enhance resilience to climate stress events.

1.3 Hypothesis, Key Questions and Objectives

Development programs and projects have been undertaken in the country with the aim to achieve long-term sustainable development improvements. These programs and projects could, however, be severely challenged by the impacts of climate variability and change. To be able to achieve the Millennium Development Goals (MDGs), development policies and initiatives must take into account climate change and variability and associated impacts. By applying the 'win-win' and 'no-regrets' policies and measures, development policies, climate change policies and disaster-risk reduction policies could be better improved, streamlined and made more effective. As indicated above, effective adaptation to climate stress, including climate change and variability cannot be achieved without effective cooperative governance. Uncoordinated and inappropriate responses to

extreme events such as drought, it is suggested, heighten risks to re-occurrence of events (i.e. maladptation).

The hypothesis underpinning this thesis, therefore, is that coordinated governance that includes effective successful integration of disaster-risk reduction, climate change adaptation and sustainable development reduces risks to multiple threats and challenges during extreme events, such as drought. The thesis investigates a number of themes including: drought-related challenges in an area; response strategies and also associated disaster costs and finally, the extent to which these are, or can be successfully linked to development strategies and plans to reduce vulnerability and enhance resilience during times of climate stress.

The key research question is:

How can South Africa reverse the trend of the persistent, cyclical need for relief assistance during times of climate stress (e.g. drought periods) by better integrating current policy efforts in disaster-risk reduction, climate change adaptation and sustainable development to reduce vulnerability and enhance resilience to changes?

The specific objectives and areas of investigation include:

- Examining, from existing policy documents, how current development plans and policies accommodate, if at all, impacts associated with climate change and variability, and how these could be ramped up for climate change adaptation.

- Investigating how these policies influence, if at all, the interaction between local livelihoods, vulnerability and adaptive response strategies of communities to drought. Are these policy interventions enhancing or reducing vulnerability to climate stress periods?

- Investigating how institutional governance operates in managing climate-related risks by examining the disbursement of funds, as well as expenditure related to disasters and disaster-relief programs and finally;

- Based on the outcomes of the above, reconstruct a framework that mimics Figure 1.1, illustrating the structure of existing cooperative governance in drought management between the several spheres of government in South Africa.

The intention of the study therefore is to:

- Firstly, examine the pathways of various interventions, particularly those designed for disaster-relief and those for development. The focus will be on what is being done by the relevant lead government departments tasked with droughts as management portfolios (e.g. Water Affairs and Forestry, Environmental Affairs and Tourism, Provincial and Local Government, National Treasury and Social Development) to deal with the adverse impacts associated with such climate variability.

- Secondly, to examine the intersection and/or deviation of these departments with relevant policies aimed at dealing with disasters, such as droughts, through a detailed investigation of institutional mechanisms and other measures (e.g. budgeting and costs) that are in place to cope with such events both currently and for future planning.

- Thirdly, the impact and outcomes of such interactions, as felt and the perceived benefits for communities on the 'ground' are examined to assess the 'value added' of such interventions.

Why a focus on drought? At present very little information exists regarding how 'creeping' disasters such as droughts, including their impacts on development, are being managed in the country. More importantly, there are few good mechanisms to measure or define the impacts and effectively capture disaster losses associated with creeping disasters such as drought. By contrast much more is being done on shorter-term and more dramatic hazards such as floods, for example by the Disaster Mitigation for Sustainable Livelihoods`Program (DiMP) from the University of Cape Town (DiMP, 2007; DiMP, 2005a; DiMP, 2005b and DiMP, 2003). In South Africa, little

research is available on how policies can better articulate drought response measures, including climate change adaptation, particularly across and between different spheres of government. There are also very few examples on the effectiveness of current disaster-relief measures and how these are contributing to development of affected communities.

Given this background, the drought of 2004/05 that occurred in the Eastern Cape was chosen for further investigation in this case study. Reasons for selecting this phenomenon for attention include:

- Drought, unlike other natural hazards such as floods, earthquakes or cyclones, is a creeping phenomenon that takes a considerable timeframe for it to be recognised.
- Drought can be protracted and insidious, and as such its creeping nature requires a proactive risk-reduction approach.
- Impacts associated with drought go beyond mere climatic change to affect other societal elements such as livelihoods, development and other various socio-economic spheres.
- The drought of the 2004/05 happened immediately after the Disaster Management Act No. 57 (DMA) was released in 2002, and the Disaster Management Framework (DMF) in 2005 and it is therefore, anticipated that any response to the disaster should have been guided by both the Act and the Framework.
- This 2004/05 drought had significant impacts on the livelihoods of the poverty stricken villages of this region.
- Because of the severity of these impacts, these areas were declared as disaster areas in 2004 and urgent government interventions were required.

Droughts are a major threat, and probably the most important recurring climate hazard in the Eastern Cape (see Chapter 4). The Eastern Cape was thus chosen as the focus area for a variety of reasons, not least because it presents some of the 'double exposures' that Leichenko and O'Brien (2008) argue, need to be understood before any sustainable adaptation to climate stress can be ensured. Firstly, the Province is exposed to multiple stressors (poverty, HIV/AIDS and unemployment), including multiple climate stresses such as droughts, floods, veld-fires and

tornadoes. Secondly, the drought of 2004/05 in the Eastern Cape was so severe that it prompted a national response in the form of disaster-relief funding, in which the national government had to work together with provincial and local governments, as per the DMA of 2002 to respond to the drought.

1.4 Thesis Roadmap

Having given this brief background and rationale for this thesis, the following section gives a roadmap of what will be presented in the next chapters of this thesis.

Chapter 1, as already shown, outlines the motivation and rationale for this study and highlights the urgency for the need of the integration between disaster-risk reduction, climate change adaptation, sustainable development and governance. The links and possible synergies between these concepts are also briefly introduced. Having given this background, the hypothesis, aims and objectives of the study have also been outlined.

Chapter 2 presents the research methodology. Firstly, a more detailed background about the Eastern Cape Province is provided. Further focus is given on the areas that have been selected for detailed investigation. Secondly, the research methodology is outlined. The research work was carried out in two phases. The first phase was the pre-feasibility phase just to test the ground and the second phase was the detailed fieldwork. Finally, the challenges encountered during fieldwork are discussed.

In Chapter 3, some of the theoretical debates on the linkages between disaster-risk reduction, climate change adaptation, sustainable development and governance are discussed. The key argument presented in this chapter is that climate change and its associated impacts may limit progress in sustainable development particularly for developing countries. Effective adaptation to climate risks (either in the short-term coping and or the longer term 'adaptation') is key to reducing vulnerability and increasing resilience of poor communities. There are possible synergies between adaptation and disaster-risk reduction that can provide a possible platform for improved risk governance. What hinders proper integration, as will be shown in this thesis, however, is poor and weak governance, including the design of both an effective governance architecture and implementation of such governance structures and processes at various levels.

In Chapter 4, a brief introduction to the general weather and climate of South Africa, including some of the future climate change scenarios, are briefly outlined. It is shown that the country is prone to climate hazards, particularly droughts. Furthermore, South Africa is expected to experience not only drought, but all other types of hazard, e.g. floods, storms, fires etc. Drought, however, is a recurrent feature that exposes the country's vulnerability and lack of capacity to cope with such hazards when they do occur. The country's commitment to the development of the poor is threatened by drought-related impacts. A brief summary of national policies, plans and programs aimed at sustainable development and risk-reduction in South Africa is given. The structure of governance as described in the country's constitution is also discussed.

Chapter 5 presents the first set of research findings, focusing on the first two objectives of this study. An analysis of development activities identified in these plans is given. The objective is to

give a general idea of how these municipalities attempt, either successfully or unsuccessfully, to incorporate climate change concerns into their development initiatives. Using the 2004/05 drought period as an example of climate stress, an examination of how people cope during such difficult times is also undertaken. The links, positive and/or negative, between development planning and drought impacts and responses between government and local communities are examined.

In Chapter 6 the last two objectives are analysed, focusing on government institutions and costs related to drought disaster-relief in South Africa and the Eastern Cape. These costs and relief payments are then evaluated in the light of the Disaster Management Act that calls for effective, integrated and holistic risk-reduction approaches that are proactive rather than reactive in design. These costs are thus presented and evaluated against the development money that municipalities claim in their IDPs for development. The governance and institutional dynamics of drought management are discussed. Disaster-relief funds given to the Eastern Cape Province by the Department of Social Development, as part of the response to the 2004/05 drought period, are interrogated further. Using this case study, the aim is to explore and uncover how various governance structures, responsible for disaster-response, work in times of disaster. The outcomes of the study are then drawn together using the framework modeled after Schipper and Pelling (2006) as presented in Chapter 1, Figure 1.1.

In the concluding chapter, Chapter 7, important results of this work are presented. Challenges facing South Africa in implementing appropriate climate change adaptation are discussed. The conclusive argument presented here is that South Africa, where risks to climate change are high, needs to factor in climate change adaptation into its development and disaster-risk initiatives. It is

acknowledged, however, that this is not an easy exercise. This approach, moreover, would be useful in that first, it will assist in reducing vulnerability and increasing resilience of communities against climate variability. Secondly, if projected changes are not as severe in reality, adaptation will still help in building the livelihoods of communities and reduce their vulnerability against future changes and hazards. Thirdly, coupled with good disaster-risk reduction structures, such an approach will reduce spending on reactive disaster-relief funds that could be better invested in development. In South Africa, there are still a number of challenges to overcome before such goals can be achieved. One such challenge is, for example, a well-coordinated structure of governance between the three tiers of government and between national government departments responsible for various sectors of service delivery and development.

1.5 Summary

The core of this study is about enhancing planned adaptation to climate change and climate variability in South Africa. The problem and the rationale for the study have been introduced and key research questions outlined. It is anticipated that developing countries, such as South Africa, in the face of climate change, are likely to face challenges in the implementation of effective climate change adaptation. These challenges, amongst other things, include the integration in policy and practice of concepts such as climate change adaptation, disaster-risk reduction, sustainable development initiatives and governance. Severe droughts constrain development in the country and thus provide a useful test case against which effective disaster-risk reduction, climate change adaptation and sustainable development are explored. For this study, a specific reference is made to the drought that occurred in the Eastern Cape in 2004/05. As will be discussed later, this drought imposed tremendous hardships to the poor communities of the region such that the national government had to intervene.

CHAPTER 2

RESEARCH METHODOLOGY

2.1 Introduction

In this chapter, a detailed account of how this study was undertaken is explained. Firstly a brief description about the Eastern Province, the second most impoverished Province in the country, is given, including its development goals. This context influenced selection of possible methods and therefore needs to be prefaced here. This background is also important for one to understand the governance and development context within which risk, existing vulnerabilities and exposure to climate stress currently occur in this Province. The analysis of the Eastern Cape is then followed by an examination of the two areas chosen for this study, i.e. O. R. Tambo and Amathole District Municipalities. These areas were seriously affected by the drought of 2004/05 such that they were declared disaster areas. The research methodology is then discussed.

Research was carried out in two phases. The first phase examined the feasibility of the study and the second phase focussed on the thematic areas, i.e. the actual research work. Finally in this chapter, the challenges faced during research are discussed.

2.2 Brief Background of the Eastern Cape Province

2.2.1 Demographics and Development Background

The Eastern Cape (Figure 2.1) is located on the south eastern seaboard of South Africa. It is the country's second largest province with an area of 170 600 km². The capital, Bisho, is located 60 km from East London, one of two ports in the province, the other being Port Elizabeth. The

Eastern Cape is the poorest province, e.g. average household monthly expenditure, followed by Free State and the Northern Province (STATSSA, 2003)[1].

With its estimated six million people (STATSSA, 2003), the Eastern Cape has the third largest provincial population. The languages spoken are IsiXhosa (mother tongue), English and Afrikaans. The province has five universities, three technikons and 20 technical colleges. Despite the presence of such high quality educational facilities, 20,9% of those aged 20 years or older have never received any schooling, while 4,7% have completed some form of higher education. Some of the demographics for the Eastern Cape are indicated in Table 2.1:

Table 2.1: A comparative analysis of change in demographics[2] in the Eastern Cape Province from 1996-2007

	CENSUS 1996	**CENSUS 2001**	**CS 2007**
Population	6 147 244	6 278 651	6 527 747
Unemployment	24.1 %	26.2%	
Absorption rate (employment)	18.4%	16%	
Non-economically active population (students, housewives, retired men, pensioners)	57.6%	57.7%	
Formal dwellings	34.2%	40.7%	
Traditional dwelling	48.7%	43.9%	
Piped water within a dwelling		63.2%	70.4%
Flush toilet		33.7%	40.2%
No toilet		31.3%	25.2%
No schooling	22.8%	20.9%	
Electricity for lighting		50.0%	65.5%

(Source: Statistics South Africa, 2007)

[1] Please note that, some data may have been updated by STATSSA, the data that has been used for the purposes of this study covers the period 2002-2007 only, which is the period embracing the drought chosen for examination.

[2] Please note that in some areas, the data was not available to compare statistics. The census of 2001 was the first ever census in South Africa that noted other races, i.e. Indian, Black and Colored, hence the gaps in this table.

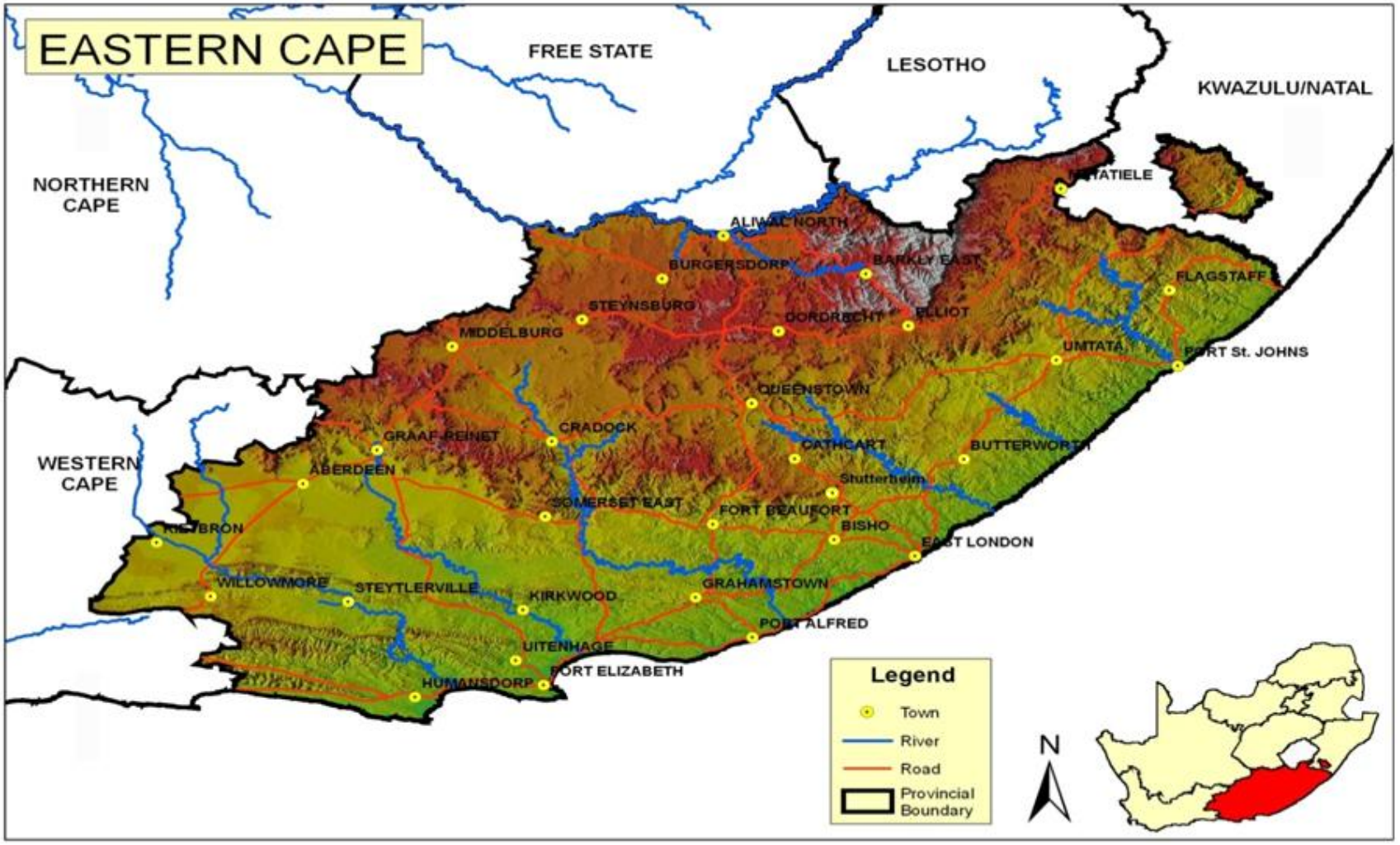


Figure 2.1: Map of the Eastern Cape
(*Source*: DEAT, 2000, GIS Directorate)

The development strategy of the province is laid out in the Provincial Growth and Development Plan (PGDP) 2004-2014 of 2004. The PGDP provides the strategic framework, sectoral strategies and programs aimed at achieving rapid improvement in the quality of life for the poorest people of this Province. It was envisaged that the PGDP will provide an opportunity for long-term co-operation between the provincial social partners around a coherent socio-economic development strategy (PGDP, 2004). To do this, the PGDP sets out a vision with quantified and sequenced targets in the areas of economic growth, employment creation, poverty eradication and income redistribution for the ten-year period of 2004-2014.

The vision for growth and development in the Eastern Cape Province aims to make the Eastern Cape a place to live, work and invest in. This Plan represents a change from previous development planning processes in the province which tended to be sectorally-driven and reactive, fragmented and short-term. The PGDP is a medium to long-term (ten-year) strategic planning tool that prioritizes major structural deficiencies in the economy. Some of the key challenges and constraints that need to be addressed in the province through this plan have been summarized below (PGDP, 2004, 15-16):

- Wide-spread and deep rooted poverty with some 67% of the provincial population living below the poverty line.
- Sub-optimal economic growth that is estimated at 2,4% between 1995-2001, and stagnation in key labour absorptive sectors such as agriculture.
- Rising unemployment – estimated at 55% in 2003.
- A provincial labour market characterized by those employed in the core consumer economy, consisting of the dominant high-wage modern sectors of manufacturing, government service, and other industries and services.
- People employed in the marginal sectors such as commercial agriculture and domestic service; and the peripheral labour force, including the unemployed, and those engaged in subsistence agriculture and the informal sector.
- Constraints on Provincial expenditure, with some 83% being allocated to social services and only 17% to economic programs and infrastructure, compounded by an extremely weak revenue base at municipal level.

- High HIV/AIDS prevalence throughout the Province, exacerbated by high levels of poverty, and backlogs in water, sanitation, and access to health care.

The province also has a number of additional factors that configure the landscape in which various stresses operate, e.g. biophysical and various socio-economic dimensions and hazards that make it a suitable province to investigate for this thesis. These include prevailing climate, industrial and economic dimensions.

2.2.2 Climate

The province varies climatically from mild temperate conditions (14-23 degrees Celsius) along the coastal areas to slightly more extreme conditions (5-35 Degrees Celsius) in the inland areas. On rare occasions the inland mountain areas experience winter snows. Maximum rainfall is observed in summer. Periods of drought and floods, sometimes extreme and extended periods of floods and droughts can occur (Tyson and Preston–Whyte, 2000) (see further detail in Chapter 4).

2.2.3 Industry

The metropolitan economies of Port Elizabeth and East London are based primarily on manufacturing, the most important being car manufacturing. The province contributes approximately R30 billion (2004 estimates) to the national GDP and is widely regarded as having the potential to substantially increase this contribution as South Africa moves towards an export-led industrial strategy. With two harbors and three airports offering direct flights to the main centres, and a good road rail infrastructure, the province has a potential for growth and economic development (PGDP, 2004).

Other major industries in the province include agriculture, textiles and clothing, tourism, wool, timber and transport. Tourism is expected to be the major growth industry as the province has over 800 km of the warm coastline of the Indian Ocean, fishing, mountain hikes, biodiversity,

game reserves and numerous resort hotels, all within a three hour's drive from the major centres.

There are also two major spatial development initiatives (SDIs), the Fish River SDI and the Wild Coast SDI, and two industrial development zones (IDZs), namely the West Bank (East London) IDZ and the Coega IDZ. The latter, 20 km east of the Nelson Mandela Metropole, was the first IDZ to be earmarked and is one of the biggest initiatives ever undertaken in South Africa (PGDP, 2004).

2.2.4 Economic overview

The Eastern Cape is also endowed with human and natural resources, but these are utilized below their productive potential, due mainly to an insufficient accumulation of physical and human capital. Increased direct foreign investment together with increased indigenous investment will allow the full economic potential of the province to be realized. Table 2.2 below shows some important economic sectors in the Eastern Cape that bring in revenue (PGDP, 2004).

Table 2.2: A comparison of gross value added-broad economic sectors (in R000)

	1996		**2002**	
		%		%
PRIMARY				
Agriculture	2 781 654		2 956 975	7
Mining	22 579	0	22 397	0
Total	**2 804 233**	**8**	**2 979 372**	**7**
SECONDARY				
Manufacturing	7 963 329	22	8 733 001	21
Electricity	598 456	2	666 500	2
Construction	1 080 225	3	1 174 069	3
Total	**9 642 010**	**26**	**10 573 570**	**26**
TERTIARY				
Trade	5 456 705	15	5 796 581	14
Transport	2 563 190	7	3 729 617	9
Finance	4 197 072	11	5 643 232	14
Commercial Services	12 297 145	33	12 610 597	31
Total	**24 514 112**	**66**	**27 780 027**	**67**
TOTAL	**36 960 355**	**100**	**41 332 969**	**100**

(*Source*: PGDP, 2004)

Notwithstanding the sectors that stimulate economic growth, the province is still severely afflicted by poverty and unemployment. This is illustrated by the following key features (STATSSA, 2007):

- Relatively high rural population;
- Relatively high proportion of young people;
- Relatively low proportion of employed people and
- Relatively high proportion of poorly paid employees.

In the midst of poverty and unemployment in this province, it is crucial therefore to see how the provincial and local governments are currently coping with climate variability as well as preparing to adapt to future climate change. Having given this background, the next section introduces the two areas selected for further investigation.

2.3 Areas of Study: Site Selection and Characterization

There are six district municipalities in the Eastern Cape Province, and one metropolitan area. The district municipalities are named Cacadu, Amatole, Chris Hani, Ukhahlamba, O.R. Tambo and Alfred Nzo (Figures 2.2 and 2.3); and the metropolitan area previously known as Port Elizabeth and Uitenhage Municipalities, is now named the Nelson Mandela Metropolitan Municipality (Municipal Demarcation Board, 2003).

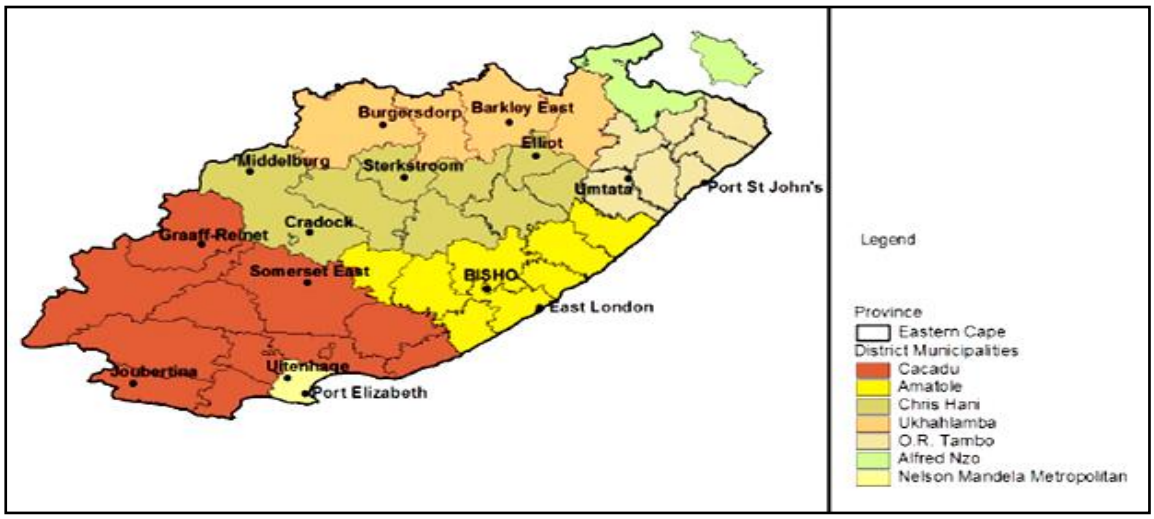


Figure 2.2: District municipal boundaries in the Eastern Cape Province
(*Source*: Municipal Demarcation Board, 2003)

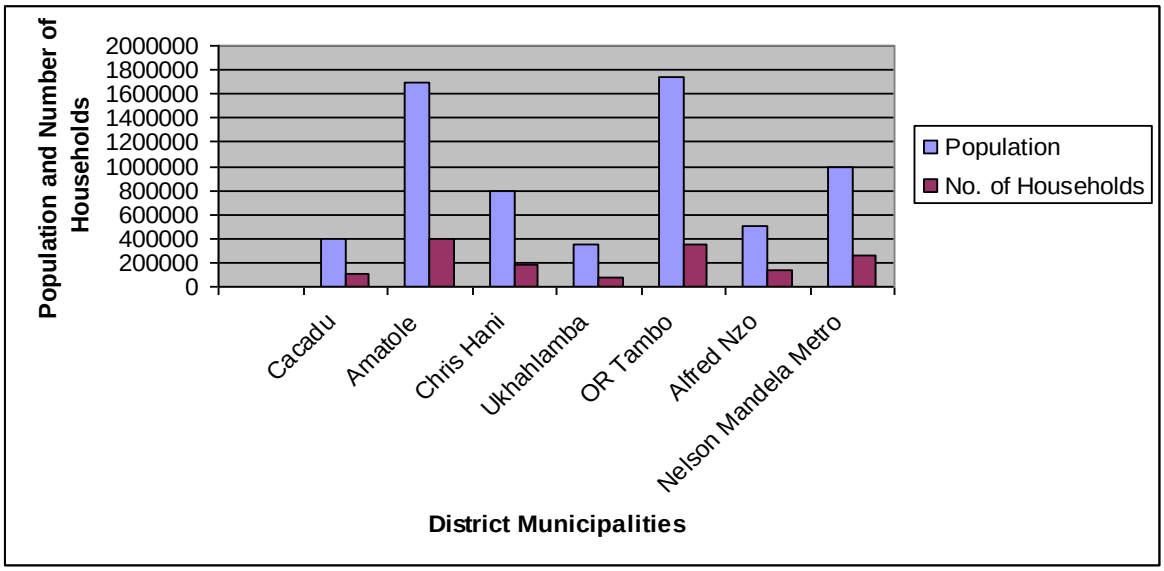


Figure 2.3: Population and number of households per District Municipality in the Eastern Cape Province – 2001
(*Source*: Municipal Demarcation Board, 2003)

Two focus areas for this study have been identified.

- Port St Johns in the O.R. Tambo District Municipality: Port St Johns area forms part of the Wild Coast Conservation area and is part of the Pondoland Centre of Endemism. Drought has been the most common extreme weather event in this area. The development of the Wild Coast Corridor started with the launch of the Wild Coast Development Initiative (SDI) in 1997. The main objective of the SDI was to kick-start local economic growth and to increase opportunities, particularly for women, through creating new small businesses in agriculture and tourism. The investment in tourism was also based on the hope that the N2 toll road that connects East London and Durban would be built (Mgquba, *et al.*, 1993).

- Emahlathini and the surrounding Border Kei Region (formally known as Stutterheim) in the Amathole District Municipality: Drought and floods have been the most extreme weather conditions that are recurring in this area. This is disconcerting given that the majority of families living in this area are highly dependent on subsistence agriculture and stock farming for livelihoods. Consequent impacts of drought include major losses in livestock and very little or no agricultural yields (PGDP, 2004).

Port St Johns and Emahlathini were selected because even though both have faced different kinds of hazards, but drought is a common phenomenon that these municipalities have had to deal with. Port St Johns is located in the former Transkei and Stutterheim in the former Ciskei. Both these areas were part of those prioritized and studied during the previous severe drought period by the Water Supply Task Force (WSTF) for the Transkei and Ciskei in 1992 (WSTF Ciskei, 1992; WSTF Transkei, 1992), thereby providing some 'baselines' against which to compare more recent drought risk-reduction efforts by the government. As indicated earlier, these areas were severely impacted by the 2004/05 drought, meriting disaster declaration. Port St Johns is located along the coast and is a tourist area that the government is promoting. Emahlathini is inland and people are mainly interested and involved in agricultural activities.

Villages in these areas were selected based on their exposure to various types of drought interventions. Villages were recipients of disaster-relief and as such they were direct recipients

of assistance that was targeted to reduce their vulnerability and improve their resilience to drought (e.g. improved water infrastructure). In Emahlathini three villages; Ndevana, Dowu and Chalumnca, were selected. These villages received direct drought-relief from the National Government. In Port St Johns two villages, Menteku and Ntafufu along the riverbanks of Umzimvubu River were selected. These villages were selected in Port St Johns because they were earmarked for further development under the Wild Coast SDI and were also prioritized in the IDP for development for tourism. These villages (through their district municipality) also received some funding from the DWAF for construction of boreholes. These cases thus make interesting comparisons for interventions designed under drought-relief response approach versus a more proactive, pro-development response.

2.4 Research Methodology

Having briefly introduced some of the 'real-world' context in which climate variability and change occurs, the final section of this chapter focuses on the methods used in this research to address the core concerns that have been outlined in Chapter 1. The research was carried out in two phases:

2.4.1 Phase 1: Pre-survey visit and collection of baseline data

A pre-survey visit to the selected areas was done in April 2007. The central objectives of the pre-survey visit were to begin to identify and examine the vulnerability context in which drought occurs. More specifically, objectives included:

- to do an initial vulnerability assessment of the villages and the communities. The initial assessment was useful in also helping determine the number of households that could be approached for research and to decide which villages to choose;
- to meet the tribal authorities such as headman, councilors and civil organizations of the selected areas;
- to demonstrate and discuss the objectives of the survey and the content of the intended questionnaire, and to assess possible outcomes;

- to introduce the survey team to the tribal authorities and to seek permission to be able to work in each of the identified communities;
- to meet Eastern Cape government officials including district officials and officials involved in the community who are responsible for drought management.
- to hear preliminarily, from communities, what measures and interventions had been undertaken across tiers of government in disaster-risk reduction e.g. identifying how the various levels of governance, work together to respond to various hazards, e.g. droughts that affect the community.

Various methods were also used to compile a simple baseline of past hazard conditions e.g. rainfall data; documentation relating to previous droughts, their magnitudes and impacts as well as a baseline assessment of current disaster-risk reduction responsibilities across various tiers of government. Two types of climate data were used to compile a climate baseline:

- Historical data, which helped in understanding past climate trends,
- Current climate observations including daily weather.

A desktop study of an analysis of current and past climate data was needed for hazard identification and to find the recurrence periods of droughts in these areas. This information was used to identify the past occurrences of drought events in the Eastern Cape Province with which people and systems have had to cope with. Some of this information is readily available from the South African Weather Services (SAWS) in Port Elizabeth and Pretoria. The aim was to establish how individuals and institutions anticipate, plan or use early warning to respond to or reduce the risks to droughts, including other types of climate variability, and how policy has influenced these actions.

This proposed approach is similar to that which has also been defined by Adger *et al*, (2002) as the ‘analogue approach’. This approach involves taking detailed case studies of past responses to climate variability and extremes (temporal analogues) or present day behavior in regions with climate conditions similar to those that might possibly develop in the region of interest

(spatial analogues). In this case, policy linked to development is critical to track and examine the present day effects of and responses to climate change and variability at all levels of social organization. This examination serves as a prerequisite for studying the effects and responses to future climate change and for identifying the key determinants of successful adaptation for the future.

2.4.2 Phase 2: Research themes and methods

The initial assessment was then followed by detailed fieldwork. The first fieldwork period took place between August in 2007 and February 2008. Further research to clarify some gaps was conducted in November – December 2008. An outline of the overall research design and approach to the thesis is included in Figure 2.4. It is important to outline upfront that four components, as listed below, have been included in this design for investigation. To structure the material, the framework of Schipper and Pelling (2006) (Figure 1.1) has been adapted (Figure 2.4). These four components include:

1. **Links between development and climate change: Integrated Development Plans (IDPs)** (Figure 2.4., Theme 1): examining local-level IDPs, including how effective these have been in assisting communities in decreasing their vulnerability to droughts.
2. **Climate hazard and coping mechanisms** (Figure 2.4., Theme 2): examining local-level disaster responses related to droughts including coping mechanisms and adaptation strategies used by communities, including the perceived role of government.
3. **Disaster risk-reduction and governance** (Figure 2.4., Theme 3): examining current disaster-risk reduction responses, the role of national, provincial and local governments; budget allocated to IDPs for development of local communities and an inventory of relief activities.
4. **Developing a national framework** (Figure 2.4., Theme 4): Based on the above outcomes, the aim of the framework is to illustrate interconnections between governance, disaster-risk reduction, climate change adaptation, and development in South Africa and how suitable is this structure in reducing risks to climate stress and implementing climate change adaptation.

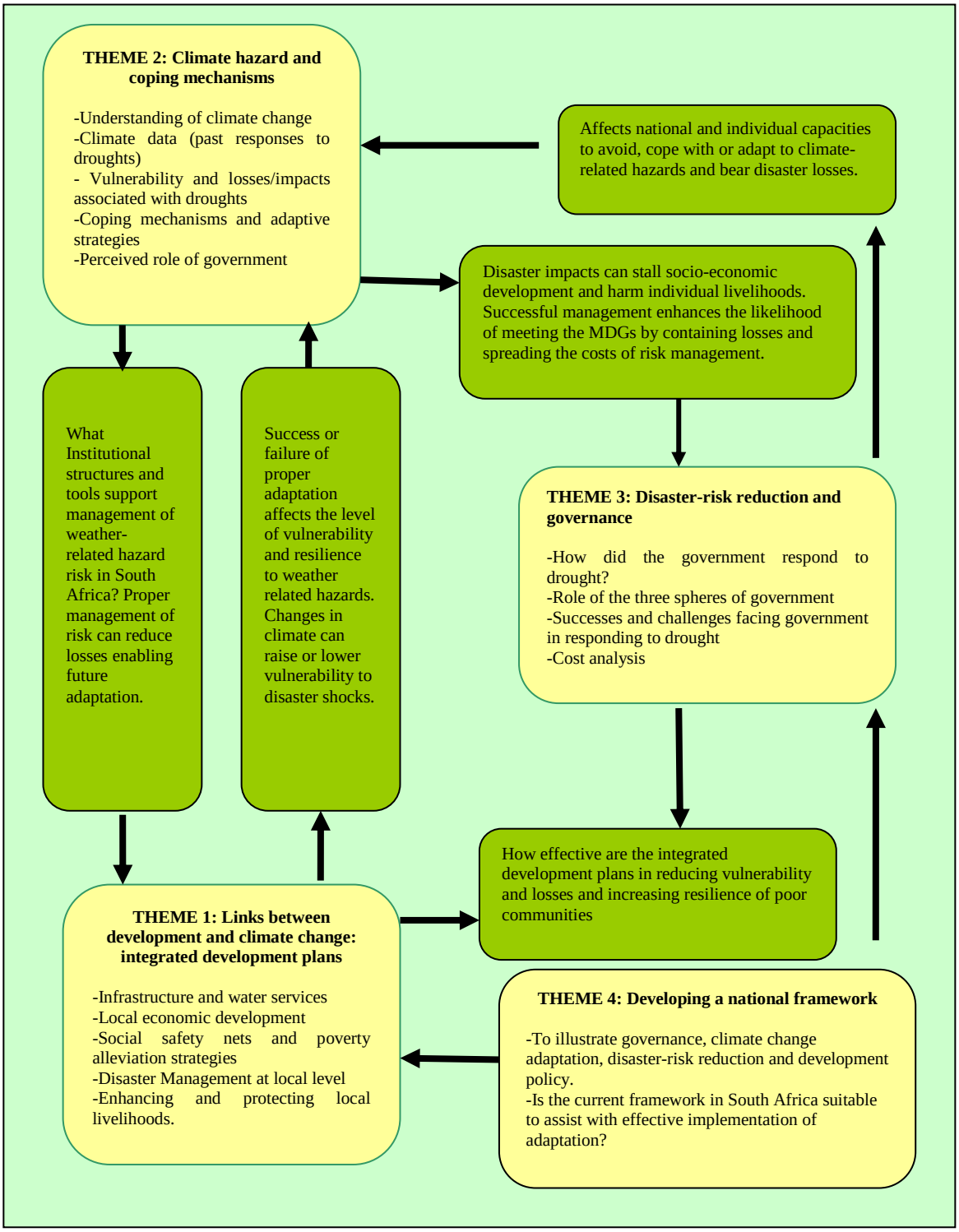


Figure 2.4: Different areas of research
(Adopted from Schipper and Pelling, 2006)

This framework was chosen because it links together very critical elements and factors that both drive vulnerability to climate (e.g. hazard and coping). Though the framework has its weaknesses, e.g. the linear representation of concepts, it provides a frame within which the key elements being discussed in this thesis can be interrogated so as to structure the argument more meaningfully. Because of its linear nature, the weakness of this framework is that it does not show how to overcome 'blockages in the system'. Such shortfalls, however, will be catered for in the discussions of the research findings.

Various specific objectives and areas of investigation, which now will be linked by themes to the research methods, and that were identified in Chapter 1 to answer the key research question of this thesis, which is:

How can South Africa reverse the trend of the persistent, cyclical need for relief assistance during times of climate stress (e.g. drought) by better integrating current policy efforts in climate change adaptation, disaster-risk reduction and sustainable development that will reduce vulnerability and build resilience to such climate stresses?

THEME 1: Links between Development and Climate Change: Integrated Development Plans

Objective 1: Examining, from existing policy documents, how current development plans and policies accommodate, if at all, impacts associated with climate change and variability, and how these could be ramped up for climate change adaptation.

Integrated Development Plans of the selected District Municipalities of the cycle 2002-2007 were consulted to provide an overview of the development activities currently operational as well as plans for future development planning. The aim was to appreciate what these municipalities are doing in their development initiatives and how such plans may intersect with

respect to current climate risk-reduction and future climate change adaptation. A desktop review study was first done. This was later followed up by detailed fieldwork to verify if the development initiatives outlined in the IDPs are visible and have added value at ground level. Fieldwork focussed on how the proposed development initiatives in the IDPs are being implemented at the community level, and how effective these development initiatives are to communities. Detailed IDP documents, though protected from public use, are obtainable on registration with the IDP Nerve Centre at the CSIR, which manages the whole IDP process for the DPLG.

The role of municipal service delivery in assisting communities' resilience to stresses, including climate stress, is also examined. These efforts were also used to garner useful information that could enhance effective risk management strategies for climate variability and change. Only certain sectors in the IDPs were selected, and the selection was informed by their relevance to climate-risk assessment, disaster-risk reduction and adaptation. It should also be noted that municipalities do not necessarily prioritise the same sectors for development initiatives, and that though meant to achieve the same objective, e.g. local economic development, sectors might be named or categorised differently under different municipalities. The selected sectors for this study include:

- Infrastructure (with specific interest on water supply),
- Local economic development,
- Social development and poverty reduction and
- Disaster management.

THEME 2: Climate hazard and coping mechanisms

Objective 2: Investigating how these policies influence, if at all, the interaction between local livelihoods, vulnerability and adaptive response strategies of communities to drought. Are these policy interventions enhancing or reducing vulnerability to climate events?

Field work in the form of participatory community assessments and key stakeholder interviews, to interrogate current disaster risk reduction interventions with respect to livelihoods and coping capacity to drought, was undertaken. Livelihood assessments were undertaken to provide an overview of 'perceived' livelihood enhancement/deterioration in the affected communities and vulnerability to stress. A questionnaire survey was used. The intention was to explore some of the underlying causes that may have heightened risk in the face of drought. At the household level, research focused on socio-economic conditions and how they had been impacted upon or exacerbated by the drought event, and then how these conditions, in turn were contributing to risk in the area. Results from the investigation should be useful in the future in that they can help provide information that may aid more effective and targeted risk-reduction and effective drought adaptation. Further, information gathered at the household level also focused on people's perception of the drought and any risk-reduction actions they took before, during and after the drought.

The specification of the scale of analysis is therefore critical, as is an analysis of the interactions between levels in terms of net livelihood effects; both positive and negative (Figure 2.5). What is important about an analysis of livelihoods (Chambers and Conway, 1992; Scoones, 1999) is the recognition of the "natural resource base" as an important component of livelihood analysis. Natural resource endowments were recognized as critical in this research, especially for the Port St Johns area. Natural resource endowments are also crucial in adaptation to climate change and variability as they inform possible economic diversification

options to new livelihood strategies. The livelihoods framework can also be applied at a range of different scales – from individual, to household, to household cluster, to extended kin grouping, to village, region or even nation, with sustainable livelihood outcomes assessed at different levels, thereby enriching inputs of coping and vulnerability (Theme 2).

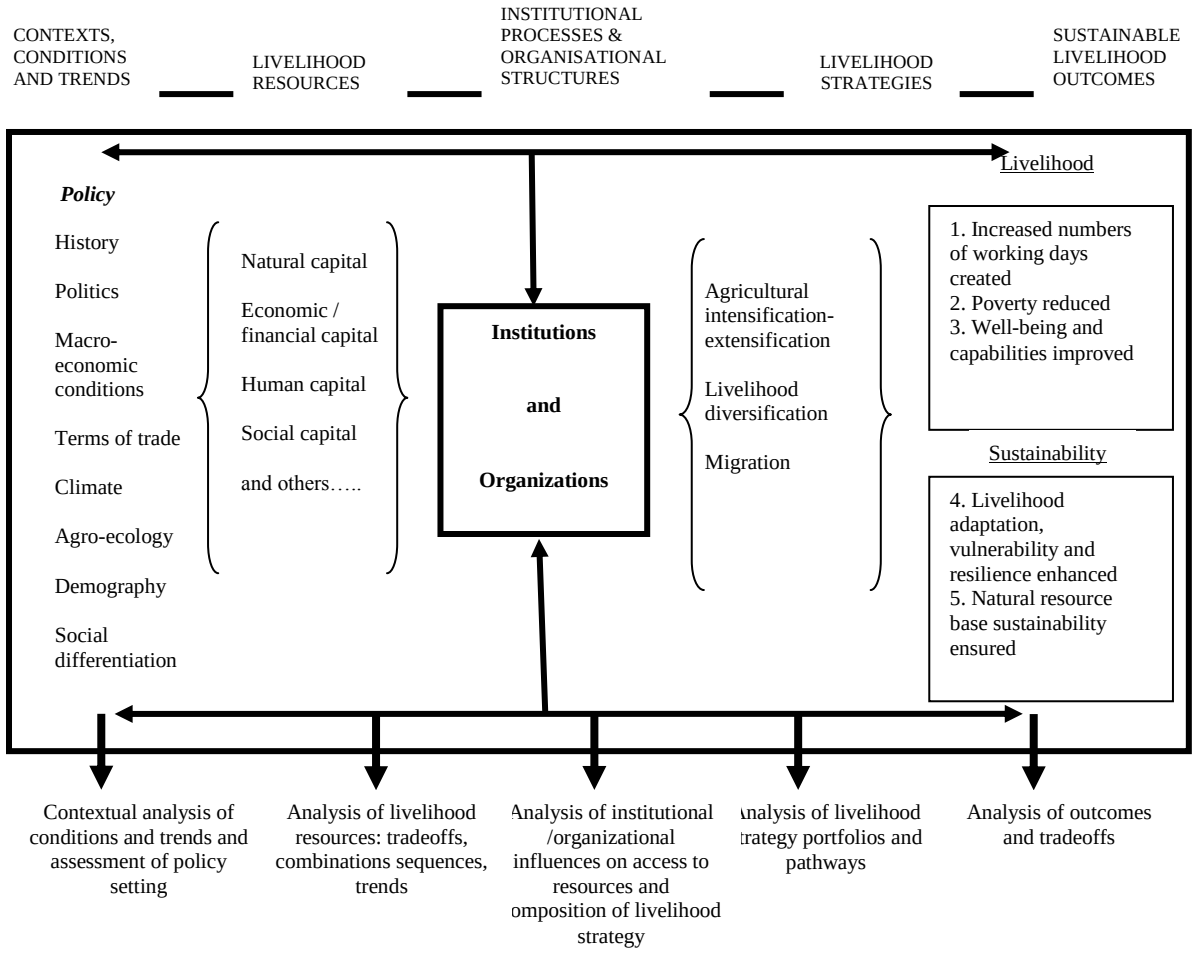


Figure 2.5: Sustainable rural livelihoods: A framework for analysis
(Source: Scoones, 1999)

Secondly, a range of other qualitative techniques were also used including in-depth focused interviews and participatory observation or participatory rural appraisal (PRA) approaches. By using PRA, a more detailed assessment of rural livelihoods can be obtained (e.g. Scoones, 1999). A key feature of PRA is its holistic approach, in which the interaction between different elements in complex people-environment relationships is a key focus. The PRA moves away

from the rather ‘top-down’ approach of the past to locally based and more engaging ‘bottom-up” approaches (Duraiappah *et al.*, 2005; Chambers, 1994). PRA has several techniques that one can choose from. For this study the following techniques were used (Bhandari, 2003):

- Discussions with key informants: meeting community elders, schoolteachers, health workers to identify key events in the past and current issues of importance in the villages.
- Group discussions: these were casual and participants were randomly selected. Snowballing techniques were used, where one informant would refer interviews to the next informants, etc. Community members also gathered voluntarily to share information.
- Past experiences and stories: community members gave information about past encounters with natural disasters, not just droughts, and related how they coped during such crises. In some instances they were able to give comparisons on recovery from one disaster to the other.
- Transect walks: walks around the area with informants proved very enlightening. People were able to identify and point out problem areas that they perceived as needing urgent attention from municipalities, e.g. water sources and deteriorated school buildings.

The PRA and the sustainable rural livelihoods framework were aimed at gathering opinions, beliefs, knowledge and experience regarding natural hazards and their impacts. The main aim here was to uncover the ‘lived experience’ of the natural hazard and associated disasters in these areas. Another key issue probed was also the drivers of change that either heightened or reduced the communities’ capacity to respond to drought, for example, what conditions exacerbated the impact of the drought?; how could such events be prevented from becoming a potential disaster?; how and in what ways were government interventions either enhancing or weakening the communities’ ability to cope with drought?

For the households, the initial plan was to solicit information using structured questionnaires. This method was discovered not to be suitable. Firstly, those who filled out questionnaires tended to fill in very brief responses. Secondly, most of the elderly, who knew about the past could not read or write. Informal interviews were thus held and used to expand on the

questionnaire information. Informal interviews were also conducted during transect walks around the villages to verify and confirm information. The aim of these interviews was to elicit information on development initiatives (as outlined in the IDPs) that have happened in the areas of study.

THEME 3(i): Disaster-risk reduction and governance

Objective 3: Investigating how institutional governance operates in managing climate-related risks by examining the disbursement of funds, as well as expenditure related to disasters and disaster-relief programs.

To better understand this objective various stakeholders responsible for disaster risk implementation were interviewed. The policies they are responsible for were then tested or compared against the perception and perceived views of the community – this was done to triangulate the links between policy, implementation and risk-reduction.

In between the field consultations, an attempt was also made to interview local government officials responsible for the implementation of IDPs in the municipalities but with little success[3]. The main aim of these interviews was to ascertain what role these Municipalities are playing and should be playing in disaster management. In the Port St Johns municipal offices, for example, no official was forthcoming. In the O.R. Tambo DM, only two officials availed themselves to answer questions telephonically, but they requested absolute confidentiality and declined to eventually participate. These interviews would have been useful in giving substantive information, thereby enhancing community inputs. Reluctance to allow information to be used could have been influenced by the wave of service delivery protests in several parts of the country at the time of writing this thesis.

[3] Please note that because of ethics and the confidentiality clause in the ethics form, respondents will not be named throughout the thesis.

At the national and provincial government levels further in-depth interview techniques were used instead of questionnaires, as officials did not have time to fill in questionnaires. Interviews were also preferred since follow-up or probing questions could be used to elicit further information. Government departments selected included Water Affairs and Forestry (DWAF), Environmental Affairs and Tourism (DEAT), the National Treasury, Social Development (DSocDev) and Provincial and Local Government (DPLG). These departments were selected because, as will be shown later, they were prioritised for government funding for drought-relief.

The aim of the in-depth interviews was to extract information from people working in and representing institutions concerned with hazard and disaster mitigation. For this study it was imperative to critically examine the role these institutions played – and should be playing – in reducing risk to hazards and disasters, and hence how they work with government departments. Another intention was also to try and understand the role that these institutions play during times of a disaster. These interview techniques were appropriate because they allowed detailed and in-depth information to be gathered and cross-checked.

Concerning the analysis of the three tiers of government[4], the aim was to understand their interactions and links in dealing with and responding to disasters associated with climate change and variability (see Figure 2.6 below). The DMA calls for decentralization of disaster responses and interventions and thus the need to examine this aspect was considered crucial to this work.

[4] In the thesis the term 'municipality', whether a district or local municipality, refers to one tier or level of governance as is described in the Constitution, hence therefore the reference to three (not four) tiers of government.

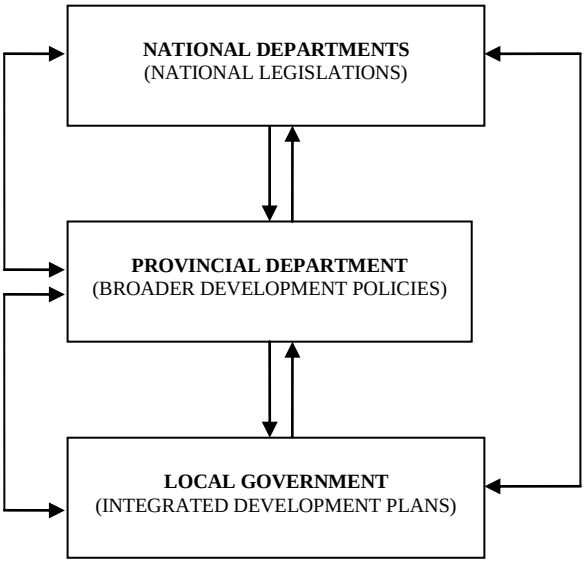


Figure 2.6: Examining interactions between national, provincial and local spheres of government

At the institutional level, in-depth interviews with major stakeholders were undertaken to elicit information from people working in and representing institutions concerned with hazard and disaster mitigation. Relevant personnel from organizations including the South African Weather Services (SAWS), Dohne Research Institute in the Eastern Cape, and the National Disaster Management Centre (NDMC) were identified and interviewed. The aim was to critically examine the role these institutions play and could be playing in terms of support related to managing and mitigating against climate related disaster-risks, both nationally and in the Eastern Cape Province.

THEME 3(ii): Drought response: An analysis of disaster costs at government level

Objective 3: Investigating how institutional governance operates in managing climate-related risks by examining the disbursement of funds, as well as expenditure related to disasters and disaster-relief programs.

Still on the third objective, the aim was to further examine more reactive, disaster-risk reduction approaches, such as actual relief spending versus those governance approaches that

include a much longer-term vulnerability-led, risk-reduction approach as outlined in the Disaster Management Act. The methods used to meet this objective included undertaking a financial inventory of any and all available disaster costs and funds released and allocated for drought relief during this period. A disaster loss and cost recovery inventory across and between various government tiers was attempted to examine how drought-relief money flowed. In one case for example, R60 million was given to DSocDev by the National Treasury. The disbursement of these funds was then tracked in the Amathole DM, to illustrate the inter-relations between the tiers of government and between departments, including implementation of disaster response measures. Research included:

- **Collection of data on costs related to drought-relief measures:** from past and present initiatives (these data are readily available) from the Department of Water Affairs and Forestry (www.bigenafrica.com/drought).

- **At the national level:** a desk-top review of policies; including the Disaster Management Act and the Framework and the Drought Management Plan. The review of these policies provided guidelines on how institutions should be reacting and responding to droughts, and it set the context for past and present disaster-relief measures.

- **At provincial level:** An investigation of how the above mentioned-policies were implemented, guided by the following questions: how do, if at all, national policies link or interact with provincial and local levels for implementation of policies? what structures, e.g. committees or forums as recommended by the DMA, exist at provincial and local levels (municipalities) to make sure those policies were articulated in an effective manner?

- **More importantly at the local level:** an in-depth analysis of the Integrated Development Plans (IDPs) of both Amathole and O.R. Tambo District Municipalities, were used to provide a basis for understanding development planning at the district level. Here attention was given to issues that were critical to livelihood development and enhancing resilience to stress, e.g. water governance, social networks, and disaster management and health issues. The aim was to uncover how local development policies are articulated and linked to disaster relief, and in turn, how these are linked or not linked to climate adaptation.

Having obtained a sense of how disaster-relief money flows across and between various tiers of government, an analysis of drought-relief responses, as well as expenditure was then undertaken, particularly focusing on the 2004/05 drought period to ascertain how much the government spent on this drought period in the Province. Also in the IDPs, costs of planned development initiatives over a period of five years (2002-2007) are outlined. DWAF, for example, already has a detailed inventory of costs for drought-relief and through an application access was granted to this data base. The aim was to track these disaster-relief costs against similar development interventions at municipal and national levels, hence the analysis of IDPs of district municipalities.

This cost analysis is a simple quantitative method that makes a detailed comparison of the costs and benefits of a particular measure, or set of measures. The major importance of doing a cost analysis is its advantages in terms of guiding development planning (McKibbin and Wilcoxen, 2004). Disadvantages in this case, however, included limitations regarding the inability and reluctance by municipalities to answer questions related to expenditure. In some cases, the municipalities could not reveal the required information because the relevant officials were bound by professional confidentiality not to release some information. According to Adger *et al.* (2003), the cost analysis can be undertaken in anticipation of change and/or, response to individual events.

Estimating costs related to climate stress, including future costs of climate change is, however, exceedingly difficult since these costs vary depending on assumptions (Gupta, 2009; Parry *et al*., 2009; McKibbin and Wilcoxen, 2004), and the uncertainty of the science (Adger *at al.*, 2003; Smit and Pilifosova, 2001*)*. Estimates of costs of adaptation versus response measures are few and most probably inaccurate (Parry *et al*., 2009). The costs of adaptation are highly

sensitive for the selection and timing of specific adaptation measures. For this study, the second option therefore was used, i.e. a broad-brush assessment of how the South African governmental institutions responded to individual disaster-related events? Data on drought-disaster losses and costs and other response measures from the DWAF and the DSocDev were examined to draw out this information.

THEME 4: Institutional mapping of drought response

Objective 4: Based on the outcomes of the above, reconstruct a framework that mimics Figure 1.1, illustrating the structure of existing cooperative governance in drought management between the several spheres of government in South Africa.

Having obtained information to assist in addressing objectives 1-3, the final objective, objective 4, was then to show the overarching architecture of the governance structure of risk-reduction to drought that operated in 2004/05.

To make sense of such varying results and sources of information an attempt has been made to compose, using the illustrative framework similar to that provided by Schipper and Pelling (2006), a flow diagram that can draw all these critical elements together. This framework neatly outlines the climate change adaptation, development, disaster-risk reduction and governance landscape, for South Africa. The aim in the thesis here is to map out some of the possible interactions and connections that exist between the various elements and to then, examine the 'sticking points', including disconnections, between various actors currently tasked with portfolios to manage risks associated with droughts. Two broad thoughts framed this effort:

1. Either South Africa has a good coherent structure of co-operative governance within its tiers of government, which is good for policy implication and aids in effective implementation of development plans and therefore adaptation or
2. South Africa has a fragmented incoherent structure of co-operative governance within its tiers of governance that makes it impossible to effectively implement any development plans, and therefore might pose serious challenges for adaptation.

By mapping out these links, in particular the structure of governance during a drought, and an assessment of how these are configured one can then interrogate how these challenges and any successes may be harnessed to improve implementation efforts for affective adaptation. Such mapping, moreover, would help in teasing out what needs to be rectified in order to implement adaptation effectively.

2.5 Challenges faced during research

Before proceeding with the literature that guided this research and the results, some of the difficulties experienced that frustrated the smooth achievement of the objectives presented above are examined. As with any research effort, a number of challenges emerged, including data availability or inavailability, methodological approaches and trying to develop an integrated assessment or framework that could be used for future studies. Some of these challenges are outlined below:

- Most of the interviewees could not read and write, so they could not fill in the questionnaires personally. Also, most interviews were conducted in IsiXhosa and had to be translated at a later stage. The disadvantage with these two situations is that information gets lost quickly or may be misinterpreted if it is not written by the person being interviewed.

- Focus groups were also held especially with the elders. The information gathered in these focus groups enabled the compilation of a richer information set that supplemented the information received in questionnaires, which usually tended to be very brief and non-explanatory.

- The outcomes of this research cannot be used to provide generalizations nor do they represent what happens in other municipalities of South Africa. The National Policies are, however, very crucial as they represent national interests. Notwithstanding these limitations the outcomes do, however, enhance the understanding of how communities cope and are coping with climate-related stresses, and how disaster-risk governance is currently operating. The results do give a starting point to understanding conditions for implementing successful adaptive measures, particularly in terms of improved institutional co-ordination.

- Several people were interviewed in this research. As will be noted, government representatives declined cooperation or to provide information on some occasion. Ethics procedures were followed as per the ethics protocol of the Human Ethics Committee of Wits University, to ensure that interviewees were satisfied with interview procedures. Because of the ethics agreement, disclosure of names, including in some cases, positions occupied by the interviewees, has been avoided throughout the thesis, particularly for senior government officials. A lack of detailed evidence is unfortunately the case therefore in some cases.

Unless indicated otherwise, the analysis given in the next chapters combines the results of both municipalities as there were a lot of similarities in the problems they faced and minor differences in terms of livelihoods. It was observed that differences in terms of livelihoods are generally so because Port St Johns relies more on its coastal location, biodiversity and tourism for food and income generating activities, whereas Emahlathini is more inland and relies more on crop production and stock farming. It is hoped that this investigation will provide lessons for which South Africa as a whole can learn in order to be able to implement climate-risk reduction strategies effectively. As will be shown in the next chapter, which focuses on theoretical and conceptual frameworks, all the concepts that are being investigated are complex discourses, such that implementation is even more of a challenge.

2.6 Summary

The area of study, the Eastern Cape has been introduced. This province is the second poorest in South Africa and it faces a range of problems namely, unemployment, lack of development, an ageing population, HIV/AIDS and few economically active people. Moreover this province is highly susceptible to droughts and other hazards. This recurrent climate hazard can undermine developmental gains and the way the government responds to such hazards thus becomes crucial for sustainable development. The methodology of how the study was undertaken has been given. The study was conducted in two phases: pre-feasibility and actual research. The first phase was to visit the communities to get a sense of the community and the 'real world' vulnerability context in which droughts occur. In phase two of the research, four themes directly linked to the objectives and tied to the key question of this thesis, are presented. Finally, some difficulties experienced during the research and other concerns (e.g. ethical considerations) are articulated.

CHAPTER 3

ESTABLISHING LINKAGES BETWEEN, DISASTER-RISK REDUCTION, CLIMATE CHANGE ADAPTATION, SUSTAINABLE DEVELOPMENT AND COOPERATIVE GOVERNANCE

3.1 Introduction

In this chapter theoretical concepts that can play a major role in the effective implementation of adaptation to climate change and variability are profiled. The discourses on climate change adaptation, disaster-risk reduction, sustainable development and governance are, however, exceedingly complex and usually mean very different things to different people. In an attempt to show how these terms are used and understood in this thesis, some key concepts are briefly introduced in Table 3.1 below, and are later expanded on to give more substance to some of the rich nuance in these various fields. In so doing some key issues are highlighted that are then used to interrogate the specific objectives (outlined in Chapter 1) that follow in subsequent chapters of this thesis.

These concepts are, however, highly problematic and complex in the way they are defined and understood by different scholars and practitioners, including how integration, where appropriate, should and could be done or approached. More importantly, this chapter aims to profile potential links that may enable the integration between these concepts, particularly climate change adaptation and disaster-risk reduction.

3.2 Some Theoretical Concepts Underpinning This Research

The literature on adaptation to climate change and climate variability, disaster-risk reduction, and sustainable development is very large and contested. Much of the nuance on the literature

linked to this thesis is more clearly articulated later in the chapter in the literature review examination, but for ease of reference the following table (Table 3.1) provides some of the concepts and their meaning as used in this work

Table 3.1: Explanation of key terms as used in this thesis

CONCEPTS	EXPLANATION
Climate related concepts	
Climate	"The 'average weather' or more rigorously, is the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. These are most often surface variables such as temperature, precipitation and wind. The classical period is 30 years as defined by the World Meteorological Organization" (IPCC, 2007a, 871).
Climate change	"A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is, in addition to natural climate variability, observed over comparable time periods" (UNFCCC, 1992,5). "Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity" (IPCC, 2007a, 869).
Climate change impacts	"The effects of climate change on natural and human systems. Depending on the consideration of adaptation, one can distinguish between potential impacts and residual impacts. *Potential impacts*: all impacts that may occur given a projected change in climate, without considering adaptation. *Residual impacts*: the impacts of climate change that would occur after adaptation" (IPCC, 2007a, 875).
Climate variability	"Variations in the mean state and other statistics (such as standard deviation, statistics of extremes, etc) of the climate on all temporary and spatial scales beyond that of individual weather events"(IPCC, 2007a, 869).
El Niño Southern Oscillation (ENSO)	"El Niño is a warm-water current that periodically flows along the coast of Ecuador and Peru, disrupting the local fishery. The oceanic event is associated with a fluctuation of the inter-tropical surface pressure pattern and circulation in the Indian and Pacific Oceans, called the Southern Oscillation. This coupled atmosphere-ocean phenomenon is collectively known as El Niño Southern Oscillation (ENSO). During an El Niño event, the prevailing trade winds weaken and the equatorial counter current strengthens, causing warm surface waters in the Indonesian area to flow eastward to overlie the cold waters of the Peru current. This event has great impact on the wind, sea surface temperature and precipitation patterns in the tropical Pacific. It has climatic effects throughout the Pacific region and in many parts of the word. The opposite of an El Niño event is called La Niña" (IPCC, 2007a, 874). .
Adaptation	
Adaptation	"An adjustment in natural or human systems in response to actual or expected climatic stimuli, or their effects, which moderates harm or exploit beneficial opportunities. Various types of adaptation can be distinguished including: *Anticipatory or proactive* adaptation: adaptation that takes place before impacts of climate change are observed. *Autonomous or spontaneous adaptation*: adaptation that does not constitute a conscious response to climatic stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems. *Planned adaptation*: Adaptation that is a result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain or achieve a desired

	state" (IPCC, 2007a, 869).
Adaptive capacity (in relation to climate change impacts)	"The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities or to cope with the consequences" (IPCC, 2007a, 869).
Adaptation costs	"Costs of planning, preparing for, facilitating and implementing adaptation measures, including transition costs" (IPCC, 2007a, 869).
Coping capacity	"The means by which people or organizations use available resources and abilities to face adverse consequences that could lead to a disaster" (www.unsdr.org/terminology).
Resilience	"The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to stress and change" (IPCC, 2007a, 880).
Disaster management	
Disaster	"A progressive or sudden, widespread or localized natural or human induced occurrence which: a) threatens to cause death, injury or disease, damage to property, damage to infrastructure, disruption of the life of community and b)is of a magnitude that exceeds the ability of those affected to cope with its effects using their own resources" (DMA of 2002, 5).
Disaster management	"A continuous and integrated multi-sectoral, multi-disciplinary process of planning and implementation of measures aimed at preventing or reducing the risk of disasters, mitigating the severity or consequences of disasters, emergency preparedness, a rapid and effective response to disasters and post-disaster recovery" (DMA of 2002, 6).
Disaster mitigation	"Measures aimed at reducing the impact or effects of a disaster" (DMA of 2002, 7).
Disaster or emergency preparedness	"A state of readiness which enables organs of state and other institutions involved in disaster management, the private sector, communities and individuals to mobilize, organize and provide relief measures to deal with an impending or current disaster or the effects of a disaster (DMA of 2002, 6).
Disaster prevention	"Measures aimed at stopping a disaster from occurring or preventing an occurrence from becoming a disaster" (DMA of 2002, 8).
Disaster response	"Measures taken during or after a disaster in order to bring relief to people and communities affected by the disaster" (DMA of 2002, 9).
Disaster-risk reduction	"The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development"(DMF of 2005, 228)
Natural hazards	"Natural processes or phenomena such as extreme climatological, hydrological or geological processes that may constitute a damaging event. Hazardous events can vary in magnitude or intensity, frequency, duration, area of extent, speed of onset, spatial dispersion and temporal spacing"(DMF of 2005, 232).
Risk	"The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions" (DMF of 2005, 235).
Other important concepts	
Sustainable development	"Development that meets the cultural, social, political and economic needs of the present generation without compromising the ability of future generations to meet their own need" (IPCC, 2007a, 881).
Livelihoods approach	"The livelihoods approach examines the command an individual family or social group has over an income and or bundles of resources that can be used or exchanged by the people to satisfy their needs (Blaikie *et al.*, 1994, 8).
Vulnerability	"The characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard. It involves a combination of factors that determine the degree to which someone's life and livelihood is put at risk by a discrete and identifiable

	event in nature or in society" (Blaikie et al., 1994, 9). "The degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity and its adaptive capacity" (IPCC, 2007a, 883)
Food security	"A situation that exist when people have secure access to sufficient amounts of safe and nutritious food for normal growth, development and an active and healthy life" (IPCC, 2007a, 875).
Food insecurity	"Food insecurity is caused by the unavailability of food, insufficient purchasing power, inappropriate distribution or inadequate use of food at household level" (IPCC, 2007a, 875).
Drought	"The phenomenon that exits when precipitation is significantly below normal recorded levels, causing serious hydrological imbalances that often adversely affect land resources and production systems" (IPCC, 2007a, 875).

3.3 Climate Change and Variability

Before elaborating on the possible responses to climate change adaptation and disaster risk reduction, one needs to clarify what is meant by climate change and climate variability. Climate change and climate variability are important concepts that require very careful understanding, particularly when used in the policy and practitioner contexts. On the one hand, the United Nations Framework Convention on Climate Change of 1992 (UNFCCC) in its Article 1 (p.5) defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is, in addition to natural climate variability, observed over comparable time periods". On the other hand, the IPCC (2007a) defines climate change as referring to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period. Climate variability refers to the variations in the mean state and other statistics (such as standard deviation, statistics of extremes, etc) of the climate on all temporary and spatial scales beyond that of individual weather events (IPCC, 2007a). Climate variability is the variation around average climate, including seasonal variations as well as large-scale variations in atmospheric and oceanic circulations, such as the El-Niño Southern Oscillation (ENSO) (Ebi *et al.,* 2005). Climate variability encompasses 'predictable' variability, i.e. the progression of the seasons but

also includes an inherent uncertainty, e.g. the rainy season is a predictable occurrence, but the amount, timing and distribution of the rains is uncertain (DFID, 2006; Ebi *et al.*, 2005; IPCC, 2007a).

Coupled to the issues of concepts and definitions of terms there is also much debate surrounding attribution and cause of climate change and climate variability. In the 20th century, there has been a consistent warming of both the land and the ocean surfaces linked to anthropogenic causes. Much of the debate of climate change attribution therefore and the global climate change discourse focuses strongly on the role of anthropogenic change. Global temperatures have been rising as a result of increasing greenhouse gas emissions. This warming is expected to continue and it is likely to be in the range 1.5^{o}C to about 4.5^{o}C in the near future (IPCC, 2007b). Impacts possibly associated with this warming; include changes in weather patterns, rise of sea level and an increase in the frequency and severity of extreme events such as floods and droughts (Ribot, 2009; Schneider *et al*., 2007; Yohe *et al.*, 2007).

Linked to the issues of attribution of causation are also the important issues of outcomes of change and consequences. The implications of climate change and variability may, for example undermine and or compound problems associated with the current and future efforts to achieve and maintain the Millennium Development Goal targets (MDGs), and sustainable development (Yohe *et al.*, 2007; Pachauri, 2004). In several cases, for example, in developing countries, the impacts of climate change may exacerbate inequities in health, access to clean water and food insecurity. These impacts could be a major stumbling block in the development of poor countries, especially their attempts at poverty alleviation (Boko *et al.*, 2007; Pachauri, 2004; Smit and Pilifosova, 2001). These impacts could be lessened, it is argued, if appropriate

interventions were taken, including adaptation to climate change and climate variability (Baethgen, 2004; Alexander, 1997).

Climate-related impacts are not only a consequence of the natural events that cause them. They are also the product of social, political and economic environments that underpin and shape the vulnerability and lives of different groups of people, as well as the region's ability to cope with climate risks (O'Brien *et al*., 2008; Marriage and Blench, 1998; Blaikie *et al.,* 1994). Thus the integration of adaptation measures with sustainable development and disaster-risk reduction approaches is necessary so that the increasing disaster-risk may be managed effectively.

There is consensus amongst many writers (including several of the contributing authors of the IPCC, 2007a & 2007b) that the solution to climate change may be rooted in new policies geared at new mitigation and adaptation technologies. Greenhouse gas emissions, for example, can be dramatically reduced, still maintaining economic growth, if the ways in which energy is consumed and generated can be changed (Diringer, 2003). The direction and drive must, however, also come from development policies. The major issue here is how best to develop policy so that it includes climate change adaptation, disaster-risk reduction and sustainable development efforts but where issues of compliance do not frustrate the overall goals of policy. As illustrated by Munasinghe (2002) and Gupta (2009), development and climate change have usually always been viewed as separate efforts. A combination of both development and climate change in policies (Figure 3.1 below), may bring opportunities and possible synergies between development and climate change adaptation. Such synergies may reduce costs of separate implementing different policies, plans, and programs.

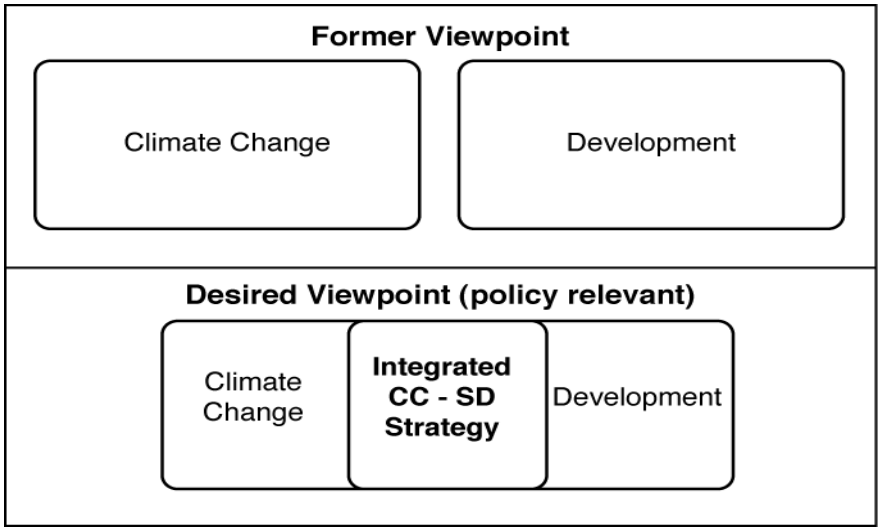


Figure 3.1: Integrated climate change–sustainable development strategy
(Source: Munasinghe, 2002)

Similarly disaster-risk reduction and climate change adaptation have usually also always been seen in isolation. Much added benefit may be obtained by holistically integrating various approaches associated with each endeavour. Other more recent assessments (e.g. Gupta, 2009 and Parry *et al.*, 2009) argue that integration, while ideal on paper, may not be that easy to achieve particularly for the case of adaptation. Adaptation experts, disaster-risk experts and policy makers, for example, must collaborate with each other in order to ensure a comprehensive risk-management approach to development at local, national and international levels (Venton and La Trobe, 2008).

Effective adaptation is also often associated with 'proper' development. Development and in particular, sustainable development, is a complex discourse that needs to be integrated with that currently being undertaken with climate change adaptation (Adger *et al.*, 2006, Huq and Reid, 2004; Adger e*t al.*, 2003). In South Africa currently, efforts to manage the environment, disasters and climate change, are located in separate and very different paradigms and often in different ministerial line-function departments. In principle, adaptation should be fundamentally linked to development in different economic sectors and to different segments of governance

(Gupta, 2009), i.e. local, regional, national and global. Having alluded to some of the issues, differences and mixed usage of key terms such as climate change, development and disasters attention now turns to examine some of the science of climate change impacts.

3.4 Africa's Exposure and Vulnerability to Climate Change

Vulnerability to climate change is considered high in Africa due to many factors. Firstly, of the 49 countries which belong to the LDCs, 32 are found in Africa. Factors that further increase the vulnerability of these LDCs include, *inter alia*, heavy reliance on rain-fed agriculture, frequent droughts, floods and poverty; while adaptive capacity is low due to a lack of economic resources and technology (Boko *et al.*, 2007; Sperling and Szekely, 2005). HIV and AIDS pandemic and poor governance practices in many parts of the continent bring additional challenges to many households and communities (Boko *et al.*, 2007; Vogel, 2004). Nyong (2005) and Vogel (2004) for example, show that while the African continent is highly vulnerable to the impacts of climate change, the continents' vulnerability is not caused by climate change only, but by a combination of several other factors such as civil wars, that characterise the continent, thereby contributing to its overall weak adaptive capacity. This weak adaptive capacity is, furthermore associated with limited financial and technical resources (Parry *et al.*, 2007; Sperling and Szekely, 2004; Beg, 2002; Klein, 2002; Smith e*t al.*, 2001).

The weak adaptive capacity, of the continent could be further exacerbated by the increased frequency and intensity of droughts that may occur with climate change. Droughts alone could worsen the food insecurity situation already prevailing in many parts of Africa, which could further worsen the HIV and AIDS pandemic (Nyong, 2005). Regions like sub-Saharan Africa, where rain-fed agriculture accounts for over 90% of food production could be adversely affected by climate variability and change (Boko *et al.*, 2007). Exposure to changes in temperature and

precipitation, as well as the various associated challenges that such changes bring, would also affect the availability and distribution of water resources. Much of Africa is dry and suffers from inadequate water supply. Some of these areas could get drier with climate change, decreasing water availability and further compounding issues of access to basic water and related services. Not all areas may be dry and some areas such as east Africa, for example, may expect to receive increased precipitation and possibly increased flooding. In some instances these benefits could be outweighed by damage to infrastructure and ecosystems. Climate change could also affect the outbreak and distribution of climate-sensitive diseases including malaria, cholera and rift-valley fever and meningitis (Boko *et al.*, 2007; UNEP, 2005).

Notwithstanding the uncertainty associated with climate change there is need to try and examine possible interventions that could be undertaken to better adapt to possible future change. In this study, drought, which is one of the most common 'creeping' hazards in the African continent and in South Africa, but of which little detailed assessment is known, is used to explore some of the linkages, synergies and tradeoffs between climate change adaptation, disaster-risk reduction, sustainable development and governance in South Africa.

Droughts

Drought has many different definitions depending on the discipline and the geographical context within which it is used. This difference in usage lies in the parameters used as a departure for classification in the definition of drought, e.g. precipitation, runoff, evapotranspiration, temperature, soil moisture or crop yields (Wilhite and Glantz 1987). Drought usually refers to an extended and significant negative departure in rainfall, relative to a "normal pattern", e.g. in South Africa, a rainfall-induced drought is defined when rainfall is 70% below average for an extended period (SAWS, *undated report*; van Zyl, 2006). Drought conditions in one region may

however, also be considered as normal conditions in a more arid region. Ambiguities can arise in the definition of drought because of the arbitrary definition of normal rainfall, particularly in unstable climate regimes (FAO, 2004; Rasmusson, 1987; Wilhite and Glantz 1987).

In Wilhite and Glantz (1987), four basic categories of droughts are distinguished, including meteorological, agricultural, hydrological and socio-economic droughts. These can be distinguished as follows:

- **Meteorological drought**: is drought that is defined on the basis of dryness in comparison to 'normal' or average amounts of rainfall for a particular area or place and the duration of the dry period. Thus, a deviation from normal measured rainfall could indicate a metrological drought.
- **Agricultural drought**: is drought that occurs when there is not enough soil moisture to meet the needs of a particular crop or grazing at a particular time. Rain-fed crops, which depend on rainfall during a specific period, are affected by this drought as it is normally typically evident after a meteorological drought but before a hydrological drought.
- **Hydrological drought**: is associated with shortages in surface and subsurface water supplies. This type of drought occurs when natural stream flows or ground water levels are significantly reduced to impact adversely on water resources.
- **Socio-economic drought**: is drought that occurs when the demand for an economic good exceeds supply as a result of a weather related shortfall in water supply. The supply of many economic goods, e.g. water, food, fish and hydroelectric power, depends on weather. Due to variability of climate, water supply is also sometimes variable and sometimes not satisfactory to meet human and environmental needs.

According to Sarmiento (1998, 2), the best definition of drought, perhaps, is that which is provided by the National Centre of Drought in Australia, which defines drought as:

"…a normal, recurrent feature of climate, although many erroneously consider it a rare and random event. It occurs in virtually all climatic zones, although its characteristics vary significantly from one region to another. Drought is a temporary aberration and differs from aridity since the latter is restricted to low rainfall regions and is a feature of climate".

The African continent has experienced different types of droughts over the years, for example meteorological and agricultural etc. (Glantz, 1987). Several African case studies have also been

documented, e.g. in Glantz (1987) *Drought and Hunger in Africa,* Brooks (2004) *Drought in African Sahel* and in a report by FAO (2004) *Drought Impact Mitigation and Prevention in the Limpopo River Basin.* Identifying and teasing out the various impacts associated with a drought is an exceedingly difficult task and will vary according to the sensitivity of the area to the drought as well as the vulnerability and robustness of the system, community or landscape being affected by drought (see for example, Figure. 9.6 in the Africa Chapter, IPCC 2007a).

According to Benson and Clay (1998) at least 60% of Sub-Saharan Africa is vulnerable to drought, and probably 30% is highly vulnerable. Such a series of consecutive droughts as shown in Table 3.2 below can have further additional devastating consequences. While the thesis focuses on South Africa, which is not shown in this table, the table below strongly illustrates the severity of drought periods, e.g. back on back years as well as lives lost and economic costs. Furthermore it provides lessons against which South Africa can start to realize impacts associated with droughts in other African countries.

Table 3.2: Some of the worst recorded droughts in Africa, 1972-2000

Year	Country	Disaster	Number killed	Number affected
1972	Ethiopia	Famine	600 000	No data
1973	Ethiopia	Drought	100 000	No data
1974	Ethiopia	Drought	200 000	No data
1980	Mozambique	Drought	No data	6 000 000
1982	Ghana	Famine	No data	12 500 000
1983	Ethiopia	Drought	No data	7 000 000
1984	Ethiopia	Drought	300 000	7 750 000
1984	Sudan	Drought	150 000	8 400 000
1985	Mozambique	Drought	100 00	2 466 000
1987	Ethiopia	Drought	No data	7 000 000
1990	Ethiopia	Drought	No data	6 500 000
1991	Ethiopia	Drought	No data	6 160 000
1991	Sudan	Drought	No data	8 600 000
1993	Malawi	Drought	No data	7 000 000
1993	Ethiopia	Famine	No data	6 700 000
1999	Ethiopia	Famine	No data	7 767 594
2000	Ethiopia	Drought	No data	1 050 0500

(Source: UNDP, Undated report)

The causes of drought are however, difficult to identify. Drought periods, in southern Africa, for example, can be linked to persistent high pressure conditions, where a blocking high pressure system prevents other rain-producing systems from entering a region. Other possible drivers of periods of drought include the El Niño Southern Oscillation (ENSO). ENSO is associated with changes in the circulations of the tropical Pacific and the global atmosphere (refer to definitions in Table 3.1). El Niño is that phase of the Southern Oscillation when the trade winds have weakened and pressure has dropped over the eastern and increased over the western tropical Pacific. This results in unusual weather patterns all over the world, usually associated with ecological and economic disasters, including droughts and floods (see for example more detailed explanations in Tyson and Preston-Whyte, 2000 and Philander, 1990).

On the one hand El Niño years, for example, have been often associated with drought over southern Africa as noted during the 1982/83, 1986/87 and 1991/92 droughts (Ogallo, 1987). Similarly, La Niña years (opposite of El Niño) are accompanied by drier-than average conditions over East Africa and above average rainfall over much of southern Africa, including central and eastern South Africa and Lesotho (Main and Hewitson, 1995; Ogallo, 1988). On the other, the linkages between drought and phenomena such as the ENSO, while linked in some cases, are not the only cause of drought (Landman and Mason; 1999a; Landman and Mason, 1999b; Mason and Jury, 1997). Drought events in parts of Southern Africa in the early 1980s were closely correlated to ENSO, however, more recent evidence from the 1990s suggests that the relationship between ENSO and drought events, particularly when closely interrogated at a local scale does not always hold (Landman and Mason, 1999b).

Warm episodes of ENSO, have become more frequent, persistent and intense since the mid-seventies (IPCC, 2007b; Sarmiento, 1998), but linking such trends directly to climate change

and variability is still not fully possible (IPCC, 2007a). Whilst there is no evidence for direct correlations between climate change and ENSO events, the dry spells associated with ENSO are critical for various communities and sectors. Some of the most severe droughts (e.g. in the Sahel, the Horn of Africa and Southern Africa) have been mostly recorded during ENSO events, e.g. the El-Niño event of 1997-8 (Devereux and Edwards, 2004; IPCC, 2001). Marriage and Blench (1998) argue that, for example, from an assessment of the frequency of ENSO events, it could be reasonable to anticipate that there may be a drought or a major flood in the African regions every ten years.

Delineating drought impacts is also difficult. Drought often exacerbates social and economic vulnerabilities, including famines and food insecurity, which can reduce the overall livelihood security of a society and usually erode resources ear-marked for development in a region (FAO, 2008; Boko et al., 2007; Ziervogel *et al.*, 2006; Sarmiento 1998). The droughts of the 1960s, 1970s, and 1980s, for example, triggered widespread starvation and loss of life and livelihoods in the Sahel and the Horn of Africa (Brooks, 2004; FAO, 2000 and 2001, Benson and Clay, 1994). Drought should, therefore, not be viewed as just a natural phenomenon or a physical event, but the outcome of a complex interplay of natural and other socio-economic factors including social, political and economic environments that underpin and shape the lives of different groups of people.

In the African continent, some examples of how drought has affected various communities are provided in Table 3.3. One common impact is food security. According to the IPCC (2007a) food security refers to a situation that exist when people have secure access to sufficient amounts of safe and nutritious food for normal growth, development and an active and healthy

life, whereas food insecurity is caused by the unavailability of food, insufficient purchasing power, inappropriate distribution or inadequate use of food at household level.

Table 3.3: Example of actual and further possible potential impacts of drought in Africa

Where	Impacts	Potential impacts
North and West Africa		
Algeria	$200 000 in crop losses	Estimated 20% loss in grain production
Ghana	Food shortage in the Northern and upper Eastern regions	
Niger	71 000 villagers faced famine in the southeastern districts	
Senegal	Drought, tens of thousands of cattle deaths and reduced cattle prices	
Ivory Coast	Drought (though subsequent rains reduced fears in decline in production	
Somalia	Flooding/drought, human/ animal deaths, property destruction and food shortages.	
East and Central Africa		
Tanzania	Drought, national food emergency (900 000 metric ton food shortage) "skyrocketing" food prices, banned food exports, cattle and cash crop losses.	More droughts, drought may affect crops, will import 150 000 tons of food, 50% reduction in maize and wheat in the Rift valley, 30-40% reduction in main harvest.
Kenya	Imported 375 000 tons of maize to offset drought looses, floods along the cost – hundreds displaced and millions of dollars in property damage, food shortages.	
Rwanda	Drought in the South, widespread crop failures.	
Burundi	Drought and food shortages	
Ethiopia	3.5 million people affected by drought, widespread crop failure, death of thousands of livestock, malnutrition, lack of drinking water.	
South Tigray	14 000 cattle deaths and 74 000 malnourished mothers and children.	
Sudan	Drought aid requested for 2.6 million people in the South.	
Congo	Drought and severe food shortages.	
Uganda	50%crop loss and thunderstorms and hailstorms in areas	
Southern Africa		
South Africa	Drought, cold and rainy weather, 17% reduction in maize, emergency drought planning and fund allocation, record high temperatures, planting maize to reduce next season crop losses, evaluating optimum crop planting schedules.	$213 million (50% reduction) in corn crop, 15% in wheat, drought, normal to below normal sporadic rains and higher temperatures.
Zimbabwe	$1.2 billion raised under drought levy, $130 million set aside for maize imports, rising food prices, unusual cold spring rains.	
Zambia	Importing maize in preparation for drought and promoting herd size reductions	
Mozambique	Drought planning	

(*Adopted from:* National Drought Mitigation Centre, University of Nebraska)

The FAO (2008, 2001) shows that, indeed there are other dimensions that have to be considered in the definition of food security, i.e. food availability, access to food, stability of food supply and utilization of food. Thus, the concept of food security goes beyond the simple notions of food production and availability, as narrowly defined by the IPCC. Whilst in the short term, socio-economic factors such as those linked to market forces may dominate food security, in the longer-term, stability and sustainability of food production and food supply may also depend largely on environmental factors such as climate change (FAO, 2008; Ziervogel *et al.*, 2006). Many rural countries of Africa depend on rain-fed agriculture which is sensitive to climate change. Less rains or above-normal rains may result in a decline of food production that which in turn may upset livelihood systems. Famines in Africa (e.g. Eritrea, Ethiopia, Djibouti, Somalia and Sudan) have been closely correlated with prolonged droughts (Devereux and Edwards, 2004; FAO 2001). Such interactions suggest that some concerted effort be made in integrating adaptive measures to climate change, climate variability, disaster-risk reduction and development planning.

3.5 Biophysical and Social Vulnerability

The relationship between potential impacts of climate change and variability AND vulnerability and adaptive capacity merits further discussion. Some basic definitions of these terms have been provided in Table 3.1. Assessments and understanding of a population's vulnerability and its capacity to cope with and respond to climate change and variability, whilst difficult to delineate clearly, are important when trying to frame meaningful interventions (Ulsrud *et al.*, 2008). There are many definitions of vulnerability (see for example Ribot, 2009; Fussel, 2007; Adger, 2006; Kasperson *et. al.*, 2005), but perhaps the classic one is that provided by Blaikie *et al.*, (1994) that vulnerability is the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard. On the one hand, Smith

(1996) when defining vulnerability draws attention to the person's or element's proneness or susceptibility to damage or injury, whilst on the other the IPCC (2007a) draws attention to the degree of the system's susceptibility to cope or inability to cope with, adverse effects of climate change, including climate variability and extremes. Adger (2006) then argues that the build or erosion of the element's social and economic resilience will influence vulnerability greatly, including the ability to absorb and to adapt in advance and in reaction to shocks.

Vulnerability depends critically on the context in which the hazard occurs. The factors that make a system vulnerable to a hazard depend on the nature of the system and the type of hazard in question (Schneider *et al.,* 2007; Adger, 2006). Vulnerability must also be understood as a dynamic characteristic that is influenced by larger-scale economic and environmental changes, and therefore must be considered from a comprehensive rather than restrictive perspective (Ulsrud *et al.,* 2008; Brooks *et al.,* 2005; Leichenko and O'Brien, 2002). According to Fussel (2007) vulnerability is an abstract concept that is conceptualized in very different ways by different scholars from different knowledge domains. Because of this, vulnerability can be used meaningfully with reference to a particular situation. Cutter *et al*. (2003), for example, classifies vulnerability research into three fields, summarised as follows:

i. Vulnerability as exposure (i.e. conditions that make people or places vulnerability to a hazard).
ii. Vulnerability as a social condition (i.e. measure of resilience to hazards).
iii. The integration of potential exposures and societal resilience with a specific focus on places and regions.

Perhaps, the most suitable definition that seems to capture all these aspects of vulnerability is that which is given by Smit and Pilifosova (2001) and Kovats *et al*. (2003) that vulnerability to climate variability and change is a function of the following:

- Sensitivity, including the extent to which the natural or social system is sensitive to changes in weather and climate including the characteristics of the population that is affected, e.g. the level of development and demographics.
- Exposure to the weather or climate-related hazard, including the character, magnitude and rate of climate variation.
- The adaptation measures and actions in place to reduce the burden of a specific adverse impact outcome, as well as the effectiveness which determines in part the exposure-response relationship.

In fact, Ribot (2009) argues that 'vulnerability does not just fall from the sky'; rather it is produced by social drivers including unequal access to resources, poverty, poor infrastructure, lack of representation and inadequate systems of social security and planning that is usually grounded in very context-places and areas. There are also other factors (see for example, Schneider *et al*., 2007; Fussel, 2007; Adger, 2006; Kasperson *et al*., 2005; Smith, 1996) that are likely to influence vulnerability to a wide variety of hazards in different geographical and socio-political and economic contexts. An understanding, therefore, of the multi-scale causal structure of specific vulnerabilities, such as economic losses, and the practises that people use to manage these vulnerabilities can point to solutions and potential policy responses. Fussel (2007), for example, refers to socio-economic vulnerability as one type of vulnerability that relates to economic resources, composed of the internal sphere (household income, social networks and access to information) and the external sphere (national policies, international aid and economic globalisation). This socio-economic vulnerability also corresponds to resilience and adaptation, as well as human coping capacity and adjustments

An analysis, therefore, of causes of vulnerability and existing vulnerabilities can be used to identify where and how society can best invest to reduce vulnerability as well as identify the institutions at each scale responsible for such exercise (Ribot, 2009; Yohe *et al.*, 2007; Smith, 1996). Reducing vulnerability of the hazards associated with current and future climate variability and extremes through specific policies and programs, individual initiatives,

participatory planning processes and other community approaches can reduce vulnerability (Yohe *et al.*, 2007). Such initiatives aimed at reducing vulnerability through proper development are the first steps toward an interactive governance process. There is a need for conscious efforts to create institutional structures that link vulnerability analysis to decision-making processes (Ribot, 2009; Turner *et al.*, 2003).

As indicated in Chapter 2, vulnerability has also been linked to the so-called 'livelihoods approach', particularly when used to identify factors driving vulnerability to drought. The concept of livelihoods is about examining the command an individual family or social group has over an income and or bundles of resources that can be used or exchanged by the people to satisfy their needs (Scoones, 1999; Blaikie *et al.,* 1994). Growing from the livelihoods approach is the concept of 'sustainable livelihoods'. Scoones (1999) shows that the concept of sustainable livelihoods is complex. A sustainable livelihood relates to a wide set of issues, which encompass much of the broader debate about the relationship between poverty and the environment. These issues include:

- Creation of working days
- Poverty reduction
- Well-being and capabilities
- Livelihood adaptation, vulnerability and resilience
- Natural resource base sustainability

The term 'sustainable livelihoods' is also subject to negotiation and different people have dissimilar views (Scoones, 1999). The aim of the whole livelihoods approach, despite the variances in definition, is to work with people, supporting them to build and realise their potential. Such an approach does away with the preconception of what people want, to seek a way of helping them achieve their goals. This approach also accords people agency and dynamism as opposed to taking both away from them. It is also the basis for identifying

constraints to livelihood development, which in turn can either heighten or weaken a person's vulnerability to risk or a hazard (Carney, 1999), and hence it is also a key component of the participatory research used in this thesis.

How people 'configure' their livelihoods is thus critical in determining how vulnerable and resilient they may or not be to a hazardous situation, e.g. a drought. Blaikie *et al.* (1994), therefore, argue that a 'disaster' will occur when a significant number of people experience a hazard and suffer severe damage and or disruption of their livelihood in such a way that recovery is impossible without external help. The severity of a natural disaster is the combination of the severity of the hazard and the degree of vulnerability of the community to that hazard (Vogel, 1998). A disaster will thus occur if risk has been poorly managed or attempts to reduce such risk have not been undertaken. The more vulnerable the society is, therefore, the greater the chance for a disaster when a hazard strikes. As shown, for example, from the case studies from Africa (Ulsrud *et al.,* 2008; Hellmuth *et al*., 2007) and Asia (World Bank, 2008), what is needed are actions that reduce vulnerability and strengthen resilience and that involve an adoption of practices that enable vulnerable people to protect existing livelihood systems, diversify their sources of income, change their livelihood strategies or migrate if this is the best option.

'Resilience' is also another multifaceted concept. Though the notion of resilience emerged from studies of ecology (see Folke, 2006), it was later adapted to other fields of study as well. Social resilience, as defined by Adger (2000) refers to the ability of human communities to withstand external shocks to their social situation, such as environmental variability, or social, economic and political upheavals. Resilience includes adaptive capacity that allows for continuous development, including the interplay between sustaining and developing with change. According

to Folke (2005 and 2006) resilience is not only about being able to withstand disturbance, it is also about the opportunities that disturbance opens up for the renewal of the system and emergence of new opportunities. Yohe *et al*. (2007) and Folke (2006), therefore conclude that resilience has important implications for adaptive governance and policy not because of adaptation to current conditions and in the short term, but on how to achieve a more sustainable development pathway into the future.

When analysing current and future vulnerability, elements of all these concepts and dimensions is required, including livelihoods and resilience to climate change and variability. Such an understanding, some argue (e.g. Agrawala, 2004; Burton and May, 2004), can add insight in the mainstreaming of adaptation to ongoing development activities at local and national levels. Mainstreaming adaptation to development, in particular for developing countries and least developed countries, should be viewed in terms of the co-benefits that would be of assistance to the implementation of adaptive measures for communities. Through case studies (Bangladesh and Mali for instance), it has been demonstrated that a great deal has been achieved in terms of describing and analyzing vulnerability to climate change and identifying potential adaptation options (Huq and Reid, 2004; Huq *et al.,* 2003). What remains however, is integrating adaptation with the national policy making process, including disaster-risk reduction and sustainable development initiatives in these countries (Schipper and Pelling 2006; Huq and Reid, 2004).

Whilst the above factors can be viewed as generic determinants of starting to develop adaptation strategies to specific impacts relevant to a particular context and hazard type, they can also be viewed as the foundation on which specific measures for reducing risk, vulnerability and facilitating adaptation are built.

3.6 Climate Change Adaptation and Disaster-Risk Reduction

Having traced the emerging concepts of vulnerability resilience above attention now turns to the heart of this research, namely climate change adaptation and possible links to disaster-risk reduction. Adaptation refers to the ability of human and ecological systems to manage or cope with a changing environment. Adaptation has the potential to reduce adverse impacts associated with climate change (Huq and Reid, 2004; Fussel and Klein, 2002; IPCC, 2001). According to the IPCC (2007a), adaptation can be defined as "an adjustment in natural or human systems in response to actual or expected climatic stimuli, or their effects, which moderates harm or exploits beneficial opportunities". Various types of adaptation can be distinguished as follows (IPCC, 2007a, 869).

- *"Anticipatory or proactive adaptation*: adaptation that takes place before the impacts of climate change are observed.
- *Autonomous or spontaneous adaptation*: adaptation that does not constitute a conscious response to climatic stimuli, but is triggered by ecological changes in the natural system and by market or welfare changes in human systems.
- *Planned adaptation*: adaptation that is the result of deliberate policy decisions, based on an awareness that conditions have changed or about to change, and that action is required to return to, maintain or achieve the desired state".

Notwithstanding adaptation efforts, some extremely vulnerable societies are still likely to continue to be vulnerable to possible heightened stress posed climate change. Anticipatory and planned adaptations are therefore, an immediate concern taking into consideration that adaptation should be highly location specific (Schneider *et al.*, 2007; Yohe *et al.*, 2007; Aguilar, 2001). Autonomous adaptation can be used as a baseline against which the need for planned and anticipatory adaptation can be based and evaluated. Any adaptation planning requires a broad view and must recognize the levels of uncertainty in climate change scenarios and that the plans themselves must be adaptable (Ulsrud *et al.,* 2008; Huq and Reid 2004). That being said, however, the FAO (2008) shows that there are some challenges that still face planned adaptation as summarised below:

- Adaptation is urgent, but also requires substantial resources and it is unlikely that developing countries, in particular the least-developed countries, have financial and technical resources for anticipatory and planned adaptation.
- Climate change is local and location specific, and as such, methods to assess adaptation need to analyze local impacts in detail and recognize that it will be necessary to include interventions into larger scale coherent adaptation programs.
- Climate change impacts will change over time, and individual elements of adaptation must change with them, therefore adaptation work will require as such, flexibility as well.
- Areas affected by climate change and variability may be flooded or become unsuitable for agriculture, therefore diversification to other economic activities and migration will need to be considered under such conditions.

Adaptation to climate change must also occur through the removal or prevention of maladaptive practices. Maladaptation refers to adaptation measures that increase vulnerability rather than reducing it. Since impacts and adaptive capacity of systems may vary substantially over the next decades, and within countries, maladaptation can happen and as such adaptation needs to be highly dynamic in space and time (FAO, 2008; Ulsrud *et al.,* 2008; Huq and Reid 2004; IPCC, 2001). Adaptive capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential changes, to take advantage of opportunities, or to cope with the consequences. Adaptive capacity also refers to the whole of capabilities, resources and institutions of a country or a region to implement adaptation measures (IPCC, 2007a; Parry *et al.*, 2007; Ebi *et al.*, 2005), hence the centrality of cooperative governance in climate change adaptation.

People of the developing countries are not just receptive victims of climate change; they have developed some resilience to hazards, such as droughts, over time. Pastoralists in West Africa and the Sahel, for example, have managed to cope with rainfall decreases of 25%-33% in the 20th century. Agricultural communities in northern Nigeria, also, have shown resilience by continuously increasing per capita agricultural production and stability in the last three decades

of the 20th century in spite of increasing aridity and population growth (Adger *et al.*, 2002). What is important, however, is the understanding of the parameters of vulnerability and the nature of livelihoods in these developing countries and how their coping and adaptive capacities can be enhanced given possible increased climate variability and change. It has been argued (e.g. in Carlsson *et al.*, 2008; Venton and La Trobe, 2008; Thomalla *et al*., 2006) that the climate change adaptation community and disaster-risk reduction community indeed need to start working together to leverage off potential synergies and opportunities.

According to the Yokohama Strategy (1994) and more recently the Hyogo Framework for Action (2005), disaster management is about measures that can be taken to manage and possibly reduce the negative impacts of disastrous events. Disaster management or disaster-risk reduction, as it is currently known, is usually a continuous process, where disasters are managed in a parallel sequence of activities, as shown in the 'Expand – Contract' Model (Figure 3.2), rather than in a sequence of actions. This model shows that the relative weighting of the actions will vary depending on the relationship between the hazard and the vulnerability of the community, and more importantly how and to what extent the existing vulnerability 'before' a severe drought heightens or amplifies existing vulnerability.

As the expand-contract model shows, prevention (including effective development planning) needs to be significant before a crisis occurs. If this is ensured then recovery and rehabilitation can occur fairly rapidly. More importantly, in the planning of disaster management or any environmental policy, the involvement of all institutions at the outset is key and should embrace all levels of governance (local, provincial and national), political bodies, the legislature, the courts and the people. This is so because disaster management is not an add-on chaotic set of actions (Hyogo Framework, 2005).

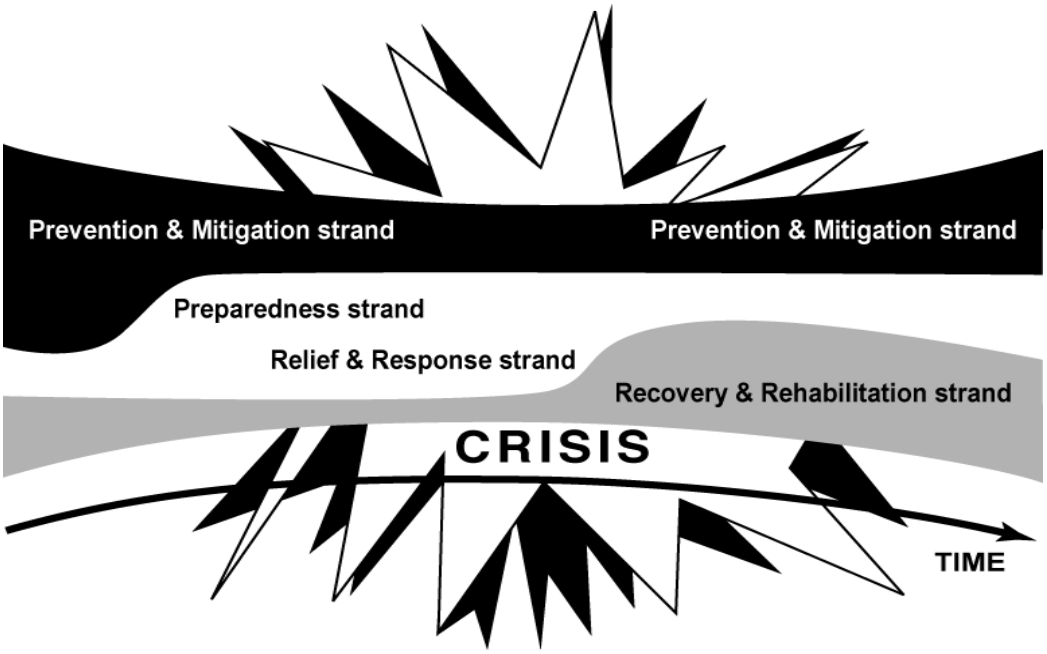


Figure 3.2: The expand-contract model
(Source: DMGM, 1990)

In the expand-contract model above, it is clear that disaster management is a continuous process and requires mandatory actions. These actions must be carried out simultaneously as shown in Figure 3.2 (World Bank, 2008). These actions are briefly explained below:

- *Prevention*—when the physical cause of the disaster can be eliminated or the potentially affected populations can move out of its range.
- *Mitigation*—when the physical cause or risk cannot be eliminated, but the potential for loss, injury, and death can be reduced.
- *Preparedness*—when people can take specific actions in advance in order to increase their personal protection or contribute to mitigation and prevention and to be ready to respond to an emergency or disaster.
- *Response*—actions taken by the community and by authorities to save life and property in the event of a disaster.
- *Rehabilitation*—actions taken by the community and by authorities to reestablish essential services, as well as social and economic activity.
- *Recovery*—actions taken by the community and authorities to reconstruct housing and facilities and to re-establish livelihoods.

Disaster mitigation is the most important part of disaster management as it considers continuous measures that can be taken to minimise the destructive and disruptive effects of

hazards and thus lessen the magnitude of a possible disaster, either prior to or following a disaster. More important is the assessment of risk and vulnerability before mitigation measures can be suggested. The mitigation plan should establish interim and long-term actions to eliminate hazards or to reduce the impacts of those hazards that cannot be eliminated. Both the management and the mitigation of disasters must be linked to the development planning so as to maximise long-term development and risk-reduction (Hyogo Framework, 2005). More importantly, as argued by Vogel (1998), disaster management and risk-rediction should no longer be the responsibility of certain government departments and private organisations; it must be a co-operative partnership between relevant departments of the government and must include civil society, given that the government cannot shoulder the whole responsibility on its own. Disaster mitigation, as it is in the case of South Africa, is still a low priority (e.g. on most aid budgets) whereas the number of vulnerable people is fast growing.

Therefore, while their scope and specific interests may differ, adaptation and disaster-risk reduction have very similar aims in terms of seeking to build resilience in the face of hazards. Some similarities (as shown in Thomalla *et al.*, 2008 and Venton and La Trobe, 2008; O'Brien *et al.*, 2008; Few *et al.*, 2006; ISDR, 2006) between the two can be summarised as follows:

- Both seek to build resilience in the face of hazards by reducing people's vulnerability through improving methods to anticipate, resist, cope with and recover from the impacts of these events.
- Both focus on climate related hazards such (as floods and droughts) and disaster-risk reduction has a longer history in dealing with such climatic events.
- Both seek to reduce vulnerability and build resilience to hazards in the interest of sustainable development, through re-shaping and re-designing of development and influencing development decision making.
- In seeking to reduce vulnerability to hazards, disaster-risk reduction community implements a variety of measures which support adaptation through reducing climate related disaster-risk and through offsetting the long term implications of climate change.
- Adaptation also has the potential to support disaster-risk reduction through reducing long-term vulnerability and influencing developmental potential.

- Both recognise poverty reduction and sustainable natural resource management as essential components of reducing vulnerability to hazards and climate change.
- Both aim to address the underlying causes of vulnerability (as discussed earlier), however, in practice perspectives on these do not yet go deep enough into the social, economic and political realms where risk is generated for the poor and most vulnerable.

Several case studies including those from Bangladesh, India, Senegal, Mali, Sri Lanka, Brazil, Mexico, Kenya, Zimbabwe, South Africa and Tunisia, show that the effectiveness of both adaptation and disaster-risk reduction can be limited if they are not viewed within the broader context of sustainable development and governance (Huq *et al*.; 2005, ISDR, 2008). These case studies provide an insight into the importance of capacity building for local communities, but moreover, they demonstrate the interconnectedness between disaster-risk reduction, climate change adaptation and development and hence the important role that is played by institutions (formal and informal) in developing adaptation interventions (Few *et al*., 2006; Huq, *et al*., 2005). As demonstrated in these case studies, disaster-risk reduction, and climate change adaptation must be closely linked to sustainable development because there are concerns about minimizing threats to progress on poverty reduction and the MDGs, but also justice and equity concerns because the impacts of climate change are often hardest felt by those who are poor and have contributed least to the problem (O'Brien *et al.*, 2008; and Few *et al.*, 2006).

Having examined the similarities between climate change adaptation and disaster-risk reduction, it is important to consider the differences as well. Venton and La Trobe (2008) draws attention to these differences, which can be summarized as follows:

- Disaster-risk reduction goes beyond climate change to include other natural hazards, e.g. geological, technological and biological hazards.
- Climate change adaptation focuses on a longer time horizon by addressing longer-term impacts of climate change.

- Again, in terms of timescale, disaster-risk reduction focuses on reducing foreseeable risks based on previous experience, whereas adaptation focuses on how climate change will be manifested in a particular region over a longer period.
- Though building resilience is the basis for both, disaster-risk reduction also emphasizes existing knowledge and capacity. The integration between that existing knowledge and an understanding of the projected impacts of climate change must be sought.
- In disaster-risk reduction, political and widespread recognition is usually weak, and as a result funding, more often than not, is *ad hoc* and weak. In contrast, adaptation is politically widely recognized and funding is sizeable and increasing.

In summary, the benefits of a more integrated approach to the issues of disaster-risk reduction and climate change adaptation are outlined by Venton and La Trobe (2008) as follows:

- Reduction of climate-related losses, using a more widespread implementation of disaster-risk reduction measures linked with adaptation.
- Increased effectiveness and sustainability of both climate change adaptation and disaster-risk reduction approaches.
- More efficient use of financial, human and natural resources.

For the climate change community, furthermore, collaboration with development researchers and practitioners also has already contributed to a shift from a theoretical focus on adaptation based on future scenarios of climate change, towards identifying broad sustainable development policy needs and a variety of practical adaptations that can reduce vulnerability (Yohe *et al.*, 2007). This integration, even though it is necessary, is in no way an easy exercise given that sustainable development a complex issue by itself (Gupta, 2009; Few *et al.*, 2006; Munasinghe, 2001).

3.7 The Complexity of Sustainable Development and Policy Integration in Climate Change Adaptation

Having outlined the need for an integrated approach to climate change adaptation and disaster-risk reduction, attention now turns to examine some of the nuances and complexities in discourse of sustainable development and climate change. Sustainable development is a

process aimed at improving the range of opportunities that will enable individual human beings and communities to achieve their aspirations and potential over a sustained period of time (Yohe, *et al.*, 2007; Brundtlant, 1987). The goal of sustainable development is to ensure continued improvements in the present quality of life at a lower intensity of resource use, thereby leaving behind an undiminished stock of productive assets for future generations. In other words, it is development that will last for a very long time. This definition of sustainable development, Davidson *et.al*, (2003) and Munasinghe (2001) argue, still remains an elusive and perhaps unreachable goal to date. The concept of sustainable development is also based on an attempt to integrate social and economic issues with environmental ones. This argument is based on the fact that environmental issues cannot be successfully addressed in isolation from human problems such as poverty and development (Brundtland, 1987).

Sustainable development has become a guiding principle for drafting policies both internationally and nationally, much like the growing focus on climate change. Translating the principle of sustainable development into practical policy is, however, not an easy task. This, according to Munasinghe (2001), is due to the complex inter-relationships that exist between the three dimensions of sustainable development; i.e. the economy, social welfare and the environment (Figure 3.3).

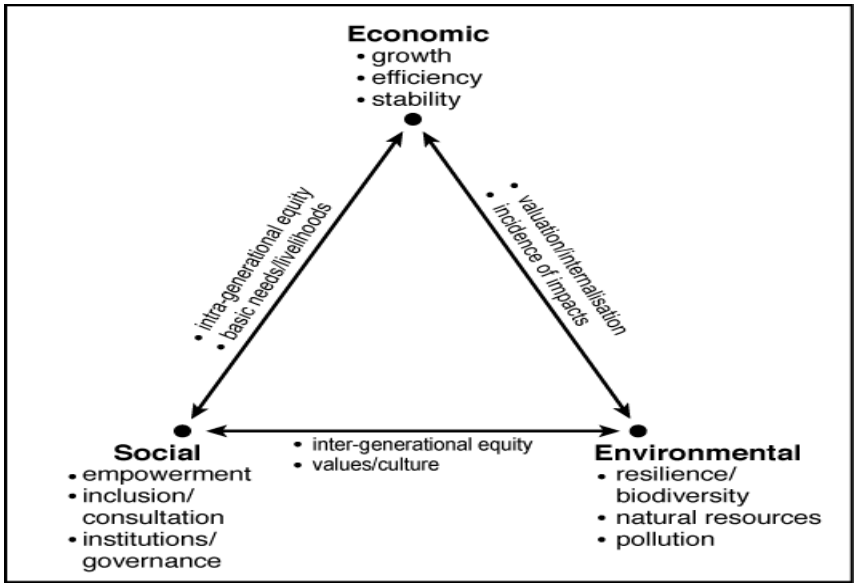


Figure 3.3: Key elements of sustainable development and their interactions
Source: Munasinghe, 2001

Bulkeley and Betsill (2003) argue that it should probably be acknowledged that there are many different interpretations of sustainable development that have emerged since the concept was first developed. The understandings and framings of sustainable development have been along "a spectrum" from "weak" to "strong" so that:

- "Weak interpretations of sustainable development imply that environmental issues should be included in decision-making processes but are ultimately tradable against social and economic considerations or that all three elements can be pursued simultaneously".
- "Strong concepts of sustainable development suggest that while tradeoffs between economic, social and environmental considerations are inevitable, some environmental systems, goods, beliefs or values are 'critical', and should be exempt from any processes of trade-off" (Bulkeley and Betsill, 2003, 21).

Any attempt, therefore, to integrate across social, economic and environmental issues at any spatial scale is complicated by the existence of complex public policy and institutional / organizational behavioral issues (Gupta, 2009). Each of the three pillars of sustainable development, for example, has its own institutional and political dynamics. Sustainability is different in all regions of the world because various regions have different sets of economic

circumstances, resource endowments, socio-economic conditions, cultures, development plans and governance strategies and structures (Robinson and Herbert, 2001). Although climate change may seem marginal to these issues, it is has become increasingly clear that the realization of development goals and therefore, sustainable development, may be severely impacted upon by climate change (Yohe *et al*., 2007; Pachauri, 2004). Hence, there has been renewed interest particularly since the 2002 WSSD in Johannesburg to put climate change in the context of sustainable development (Gupta, 2009; Tanner 2008; Davidson *et.al*, 2003; JPOI, 2002).

Given that climate change is to take place, its potential impacts may impose a major constraint on the ability of the poor countries' ability to undertake development initiatives. Climate change adds to the list of stressors that challenge the ability to achieve the ecologic, economic and social objectives of sustainable development (Ribot, 2009; Tanner and Mitchell, 2008; Schneider *et al*., 2007; Yohe *et al.*, 2007). All sectors may be impacted by climate change. However, it is not easy to detail the implications of different impacts and how each sector will respond. A summary of some impacts of climate change on various sectors is provided in Figure 2.4 (Pachauri, 2004).

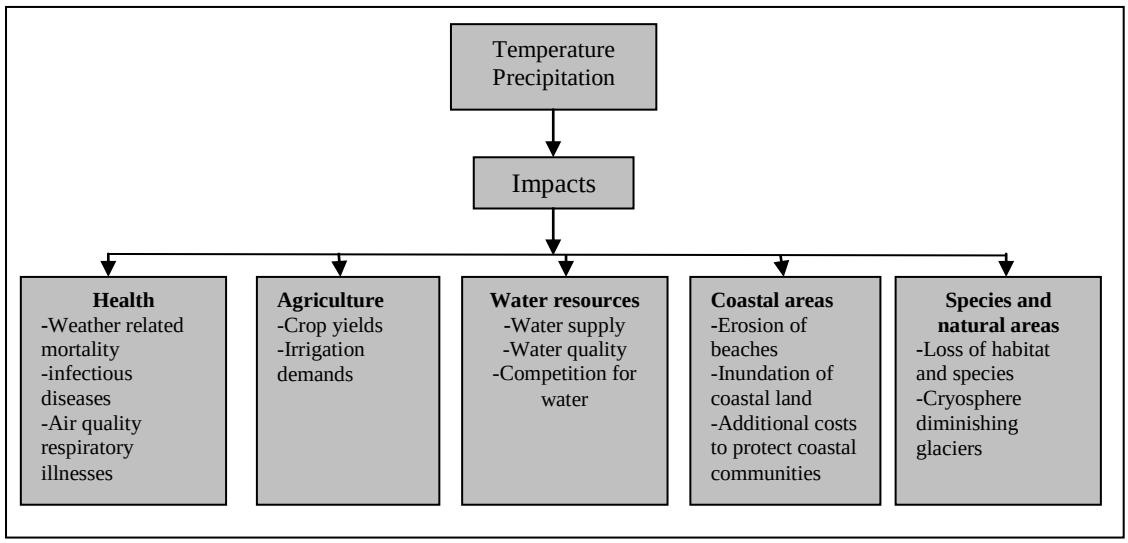


Figure 3.4: A singular effect of climate change and its cascading impacts
(*Adapted from*: Pachauri, 2004)
(*Please note: These cascading impacts are associated with climate change and not only variability as indicated in table 3.2.)*

Discerning the 'driver' or a singular causal mechanism in a cascade of impacts is difficult. Figure 3.4 illustrates how an impact can reverberate through and across other sectors. For example, changes in precipitation may result in the quantity and quality of water supply. This, coupled with impacts of higher temperatures, may have significant effects on crops as well as soil quality. This may then have negative implications on agriculture, thus threatening food security. A decline in agriculture would lead to reduced incomes for rural populations, which represent the largest number of poor people in developing countries. Livelihoods will be affected. This would then have adverse impacts on poverty reduction efforts. Food shortages may exacerbate poor living conditions, resulting in malnutrition and infectious diseases. Coupled to these impacts would be other environmental stressors such as greater severity and frequency of extreme events (Pachauri, 2004).

The example above also shows that climate change may have impacts across all pillars of sustainable development. The assumption of the 1990s, therefore, that climate change could be addressed without making links to development has proved to be rather impossible (Gupta,

2009). In fact, Munasinghe (2001) argues that sustainable development measures and climate change policies, including adaptation, can reinforce each other. The pillars are, to some extent, cross-cutting and preferences and priorities for each of them will in turn have an influence on policy. There is a need, therefore, to integrate knowledge from existing disciplines into new concepts and methods, to build a comprehensive and diverse knowledge base that could support sustainable development efforts from concept to actual practice (Yohe *et al.*, 2007, Turner *et al*., 2003; Munasinghe, 2001). This integration is a complicated exercise because it implies that all national and international development processes should 'mainstream' climate change, i.e. use the climate lens to decide which development activities should continue and which should not (Gupta, 2009).

As demonstrated above, there are clear and substantial arguments why climate change and development must be linked, however, Gupta (2009) also shows that, based on the definition of 'mainstreaming', there are concerns also why this should not be done. These concerns can be summarised as follows:

- Both developed and developing countries still have to figure out how best to achieve sustainable development and developing countries are quite lagging far behind from this exercise compared to developed countries.
- Many developed countries have promised to increase the resources for developing countries but these increases are likely to be focussed on climate assistance only.
- Such assistance is also affected by the inadequacy of the current resources to meet the challenges faced by developing countries.
- The beneficiaries of climate assistance are quite diverse, and this may imply a diversion of resources from one target group to another as well as political implications for development cooperation and for politics.
- Mainstreaming climate change into development cooperation without similarly mainstreaming climate change into other national and international development flows is likely to be ineffective.
- Mainstreaming climate change into development cooperation may translate into a new conditionality, and conditionalities are sometimes not very conducive to development.

3.8 The Challenge of Policy Integration and the Role of Cooperative Governance in Climate Policy Implementation

By ensuring that policies in areas such as agriculture, transport, energy and industry are designed with the imperative of climate protection, governments will be moving towards addressing the problem of climate change in a way that helps avoid the need for expensive mitigation and adaptation projects at a later stage (Newell, 2004; Diringer, 2003). This means that climate change and climate variability must not be viewed as isolated problems, but rather as a product of a whole series of policy choices about economic development, that need to be revised to ensure minimal impacts on climate and/or development. If this does not happen, effects of actions taken to mitigate climate change may be offset by decisions taken in policy areas such as energy, trade, transport and agriculture (Munasinghe, 2003).

The rapid rise in developing country emissions, for example, is driven by development imperatives, in particular the need for energy and economic growth. This is further encouraged by flows of investment and technology that are aimed at supporting development (UNFCCC, 2006; Munasinghe, 2003). On the one hand, future climate strategies must explicitly address these fundamental needs of developing countries if they are to be constructively and seriously engaged in common efforts towards climate protection. On the other, the extent that developing countries regard climate concerns as no more than potential barriers to their ability to reduce poverty and increase economic growth may result in climate issues not receiving the attention they deserve from the developed countries (Heller and Shukla, 2003). Countries can, however, look at this in a positive way by taking climate action as less of a constraint and more as a driver and facilitator of goals of sustainable development such as economic growth and energy security (Davidson *et.al*, 2003; Heller and Shukla, 2003).

An important challenge facing many developing countries is that climate change, particularly climate change adaptation, does not feature prominently within development policies. Responses to climate change still have to be mainstreamed into national development plans and processes (Huq and Reid, 2004; Huq, *et al.,* 2003). There is an urgent need to improve policies and institutional mechanisms (institutional reform) and this should be viewed as an integral part of development planning. Treating climate change issues as separate from the wider development planning may result in development policies inadvertently increasing people's vulnerability to adverse impacts of global change, or conversely, adaptation policies being inadvertently antagonistic to development and poverty reduction policies (DFID, 2004; Robinson and Herbet, 2001).

In some developing countries such as South Africa and Brazil, however, there are some synergies emerging between climate change policies and the sustainable development agenda such as energy efficiency, renewable energy, transport and sustainable land use policies (Beg *et al.*, 2002). Yamin (2004) and Heller and Shukla (2003) suggest that the principal aim of the international climate policy (Climate Change Convention and its Kyoto Protocol) should be, then, to influence and facilitate the capacity of developing countries to recognize and meet the challenge of synergising climate policy and sustainable development. More importantly, governments are facing a challenge of coming up with the right policies that integrate climate change adaptation, disaster-risk reduction and sustainable development (Yamin, 2004).

Currently, the political reality is that countries are likely to address climate change only if they believe that it is to their own interest to do so (e.g. the United States not ratifying the Kyoto Protocol), and then undertaking domestic policies meant to address climate change. What is important right now in international policy negotiations is that countries must understand their

respective domestic concerns and each other if they are to build a framework that will make them assist each other on generation of better policies geared at climate change and development.

Karlsson (2003) also raises another important issue, that of governance. The main argument is that the North-South divide has major consequences for governance especially because there is a huge data-gap given that the world's scientific community is heavily dominated by developed countries. The international climate policy debate, for example, is largely shaped by arguments emerging from scientific research of the developed countries, which does not really take into account the role of local governance and stakeholders that are quite influential in developing countries. There should be recognition that non-governmental organizations (NGOs) and other civil society groups are not only stakeholders in governance, but are also a driving force behind greater international cooperation through the active mobilization of public support for international agreements (Vernon, 2008; Gemmill and Bamidele-Izu, 2003). This, is because there is always an assumption that the implementation of policies of the nation-state is territorially defined, and as such must filter in the hierarchical structure of government within the nation-state as indicated in the cascade model in Figure 3.5 (Lemos and Tomkins, 2008; Bulkeley and Betsill, 2003).

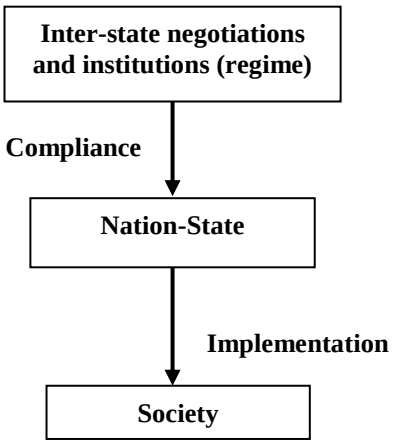


Figure 3.5: The regime theory and the 'cascade model' of global environmental governance (*Source*: Bulkeley and Betsill, 2003)

In this model the state is considered as a unitary actor or a fixed territorial entity, operating much the same over time and with interests that are uniform. Under this model, the assumption is that-sub national governments act under the sole direction of the national government such that the potential role of the sub-national government is ignored or subsumed within the nation state (Bulkeley and Betsill, 2003). In a case of international regimes, such as the climate change regime, the focus tends to remain on actors and institutions operating at the international and national scales. According to Vernon (2008), an important role for government can include helping the private sector overcome information constraints that deters them from taking action. This also includes investing in and communicating climate information. Improved climate information enables people to make rationale, informed and effective adaptation decisions.

In contrast to this, Munasinghe (2002) shows in Figure 3.6, that governance should ideally differ from this structure (Figure 3.5) in the sense that the boundaries between the public and the private sector, national and international are more blurred. Governance can be seen as an outcome of interaction and intervention efforts of all the involved sectors, where an outcome cannot be attributed to one actor of group or actors in particular (Gupta, 2009). In the case of the environment, there is no single actor that has all the knowledge and information required to solve complex, dynamic and diversified environmental problems. Climate change is one such environmental problem.

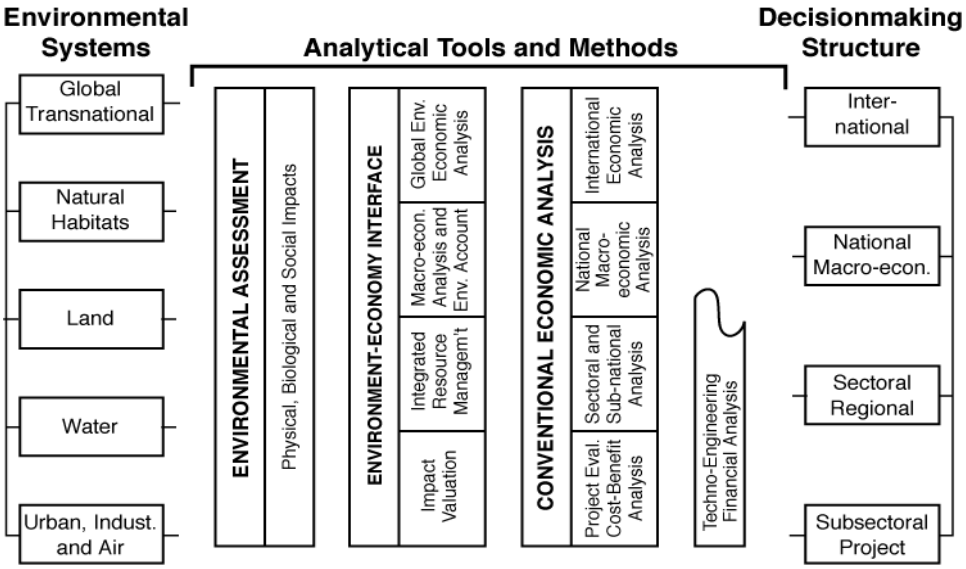


Figure 3.6: Incorporating environmental concerns into decision-making (*Source*: Munasinghe, 2002)

As stated in Chapter 28 of Agenda 21 (1997), the participation and co-operation of local authorities and civil society is an important determining factor in fulfilling the goals of Agenda 21. Local authorities are responsible for constructing, operating and maintaining economic, social and environmental infrastructure, overseeing planning processes, establishing local environmental policies and regulations and assisting in the implementation of national environmental policies (Agenda 21, 1997). Therefore, as the level of governance closest to the people, local authorities play a vital role in educating, mobilizing and responding to the public to promote sustainable development (Turner and Mitchell, 2008; Vernon 2008). Agrawal (2001) further argues that the size of the group undertaking collective action, the boundaries of the resource at risk, the homogeneity of the decision–making group, the distribution of benefits of management and other factors are all important in determining the ultimate success of collective management. Civil society, according to Gemmill and Bamidele-Izu (2003), can play a major role in five key areas as listed below:

- Information collection and dissemination,
- Policy development consultation,
- Policy implementation,

- Assessment and monitoring and
- Advocacy for environmental justice.

However, many institutional structures do not usually enable civil society to play this role effectively. The role of collective action and good governance in facilitating adaptation has thus emerged as a key and basic issue, where lessons can be learned from political ecology and other theoretical insights to facilitate present day adaptation processes (Dodman and Satterwaite, 2008; Adger *et al.*, 2002; Agrawal, 2001).

Having given a brief introduction to some of the key theoretical concepts that frame this study, the next section situates South Africa in relation to the rest of the world regarding climate change, sustainable development, disaster-risk reduction policies and governance.

3.9 Summary

In this chapter, some of the key theoretical terms and debates around disaster risk reduction, sustainable development and governance that are intertwined with the implementation of climate change adaptation are discussed. Climate change and climate variability will have negative impacts, especially for the least developed countries of Africa. Also, climate change may retard development initiatives, in several cases, and impact negatively on sustainable development. Sustainable development, in the context of climate change, will require the reduction of human, social, economic and environmental vulnerability. The challenge of meeting the aims of climate change adaptation and sustainable development lies in the promotion of environmental and climate policies that are linked with development priorities, particularly for developing countries. Climate change adaptation has similarities and synergies with disaster-risk reduction in that both are meant to build resilience against natural events and are proactive. Currently, there seems to be little focus, however, on attempts to integrate these two schools of thought in both practice and policy.

More importantly also, both adaptation and disaster-risk reduction still need to be integrated with development and development policies. Such integration is a very challenging exercise since development; more notably sustainable development in particular, is a complex issue. There is also a need for strong coordinated governance in developing and implementing policies related to climate change and sustainable development. Despite these challenges, future changes in climate and the need to adapt to these changes remain significantly urgent

and call for an understanding of how adaptation can be linked to ongoing processes such as disaster-risk reduction and sustainable development.

In summary, this chapter has presented an argument for a call for greater co-ordination between climate change adaptation, disaster-risk reduction, development experts and policy makers. There is clearly a need for better communication and collaboration with each other in order to ensure an informed comprehensive risk-management approach to development at local, national and international levels of governance. The challenge is, however, how possible is this integration and what currently frustrates such a vision.

CHAPTER 4

CLIMATE CHANGE AND VARIABILITY, DISASTER–RISK REDUCTION, SUSTAINABLE DEVELOPMENT AND COOPERATIVE GOVERNANACE IN SOUTH AFRICA

4.1 Introduction

South Africa has invested a great deal of effort on policies and programs aimed at boosting both sustainable development (through job creation and poverty reduction) and disaster management policy. These policies are used as a lens through which one can begin to view and consider some of the existing and potential challenges of integrating climate change adaptation with sustainable development in the country. This thesis is, therefore, endeavoring to show that it is not only the exposure to the physical dimensions of a hazard such as a drought that is critical, but also the amplification by various other (e.g. social and economic) drivers of change that arguably heighten vulnerability to change that are also key to understand.

In the case of the Eastern Cape it is the mix of regular drought, overlain on top of poor and weak risk-reduction measures, policy and other development failures that will be shown to heighten vulnerability to drought. In this chapter, an overview of South Africa's weather and climate is first given. This chapter begins by examining some of the biophysical risk, and then paints a canvas of some of the 'human dimensions' underlying vulnerability to drought. As shown in the previous chapter, vulnerability is also determined by a range of 'human dimensions' many of which are rooted in complex institutions and political arrangements. In this chapter these two aspects are examined by way of amplifying the background already provided in the methods chapter, Chapter 2

4.2 South Africa's Weather and Climate

South African average climate is typically warm and dry, with day time winter temperatures rarely falling below 0^{o}C, and the summer maximums often above 35^{o}C. The weather and climate of South Africa, particularly rainfall is, however, highly variable both over time and space (Hewitson and Crane 2006; van Zyl, 2006; Midgely *et al.*, 2005; Tyson and Preston-Whyte, 2000; Tyson, 1987). In South Africa, the mean annual rainfall has an east to west spatial pattern, with the eastern portions of the country usually wetter than those to the west. There are, however, seasonal variations in the regional distribution of rainfall. Precipitation over the interior northern regions of the country follows an annual cycle and is a summer phenomenon. About 80% of the annual rainfall occurs between October and March (Hewitson, 2000; Tyson, 1987). The central and the eastern parts receive summer rainfall, whilst the south western parts of the country are winter rainfall areas (Hewitson and Crane 2006; van Zyl, 2006; Midgely *et al.*, 2005; Tyson and Preston-Whyte, 2000).

Besides the influence of the positioning of the country in the subtropical regions, cyclones also play a role in the country's weather. Tropical cyclones produce rain that normally occurs over the Indian Ocean in summer. Usually there are between six and twelve systems that affect South Africa a year (Tyson, 1987). These storms are also often associated with prolonged rainfall and if penetration continues inland, flooding eventually occurs, often leading to devastating effects, as was the case for example, with tropical cyclones Domoina in 1983, Imboa in 1984 (Tyson and Preston-Whyte, 2000) and Eline in 2000 (Mgquba, 2002). As became evident during cyclone Eline, such heavy rains can extend over the East Coast and adjacent inland areas. To the west and over the central and western plateau, however, fine dry conditions usually prevail.

The country also lies within a semi arid zone with an average annual rainfall of only 464mm compared to the world average of 857mm. About 21% of the country has an annual rainfall of less than 200mm, 48% has between 200 and 600 mm, while only 30% records more than 600mm. In all, 65% of the entire country has an annual rainfall of less than 500mm (Hewitson and Crane 2006; Tyson and Preston-Whyte, 2000).

Natural hazards[5], as illustrated in Figure 4.1 below, are also a common feature in the country and have resulted in devastating consequences for the societies experiencing them. Within the last 15 years for example, a number of extreme events and their impacts have been gazetted and documented (HSRC, 2006; SAWS, 2006). These extreme events, as indicated in some future climate scenarios for South Africa, may probably worsen over time, e.g. the possibly more frequent with grater magnitude (Engelbrecht, 2009; Hewitson and Crane, 2006).

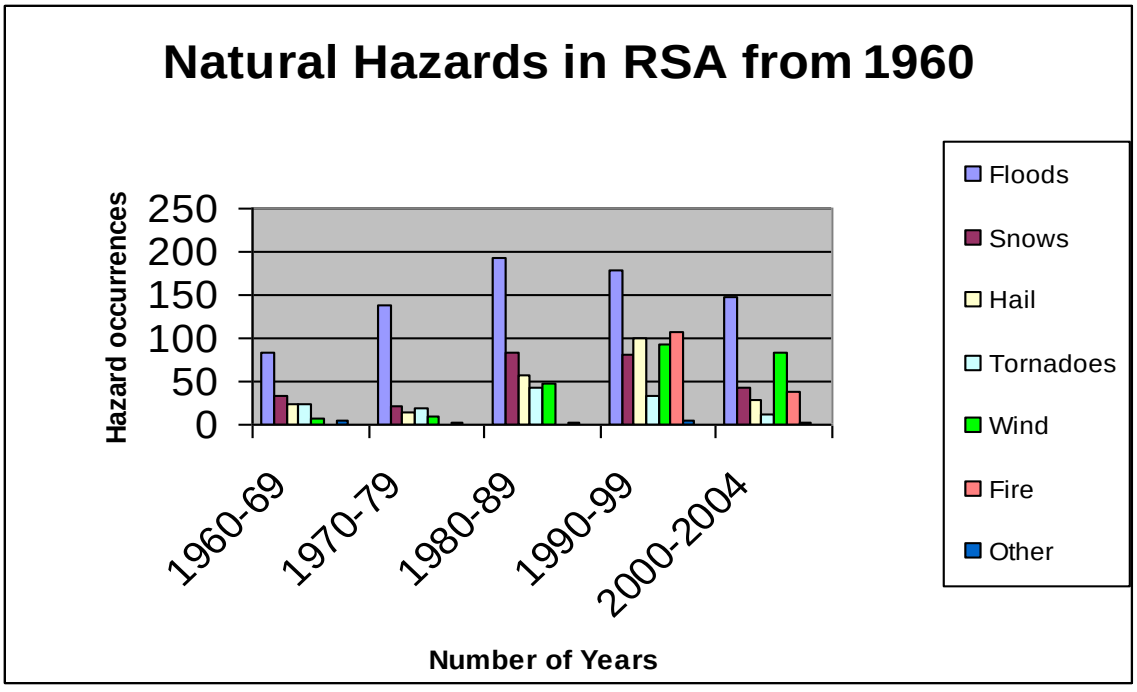


Figure 4.1: Natural hazards in South Africa from 1960-2004
(Source: Raw data provided by the South African Weather Services

[5] The detailed classification criteria of these hazards can be obtained from the South African Weather Services, www.saws.org.za.

4.3 Future Climate Scenarios for South Africa

Globally, projections about future climates are highly uncertain. Such projections do, however, give some indications of where possible future climate stress areas may occur. It is not the key focus of this thesis, however, to comment extensively about modeling and model projections, including the merits and demerits of statistical versus dynamical modeling. More details on models and model downscaling can be found in the Chapter on Africa by Christensen *et al*. (IPCC, 2007b).

As briefly indicated in the previous section, South African weather and climate is characterized by both wet and dry phases, which are also usually associated with droughts and floods. Drought occurrence also seems, from time to time, to be strongly influenced by ENSO events as was highlighted in the previous chapter (Shongwe *et al*., 2006, Landman and Mason, 1999a). The related effects of El Niño events tend to be usually associated with dry phases and droughts in the eastern parts of southern Africa. La Niña events, which involve equatorial atmospheric and oceanic conditions of opposite signs to those during El Niño events, tend to be associated with wet phases and regional flooding, especially in the summer rainfall regions (New *et al.*, 2006, Landman and Mason 1999b, Tyson 1987).

Coupled to the ENSO and La Niña phenomena are other related impacts associated with climate change. Current research as contained in the South African Second National Communication on Climate Change (DEA, 2010), for example, shows a number of possible rainfall changes for the country. Briefly, these include regional rainfall scenarios, for example, that project in some cases a general drying in most seasons in the South Western parts of the Western Cape, and between 5 and 30% reduction of rainfall during autumn and winter months (Midgely *et al.*, 2007). In summer and autumn, it is projected that the northern and eastern

regions of the country are likely to become wetter, especially over regions of steep topography around the escarpment. Another study by Engelbrecht *et al*. (2009), has also concluded that the Eastern side of South Africa is likely to become somewhat drier despite the projected increase in summer rainfall. The projected changes, therefore, in the intensity and frequency of precipitation events still remain uncertain (IPCC, 2007b; Midgely, *et al.*, 2007; Hewitson and Crane, 2006).

Early assessments have shown, for example, overall, the winter rainfall region is, for example, projected to experience a drying trend, and the summer rainfall a moistening trend by 2050 (as shown in Figure 4.2 below) with possible increases in both rainfall intensity and drought duration (Hewitson and Crane, 2006). Temperature is virtually certain to continue to increase across the country, with the greatest increases towards the interior, and with strongest trends in the daily minimum. Near the coast the projected increases are very likely to be moderated by the proximity of the ocean. Closer to the mountains and towards the interior temperature increases are likely to be greater (Midgely, *et al.*, 2007, Hewitson and Crane 2006, Shongwe *et al.*, 2006).

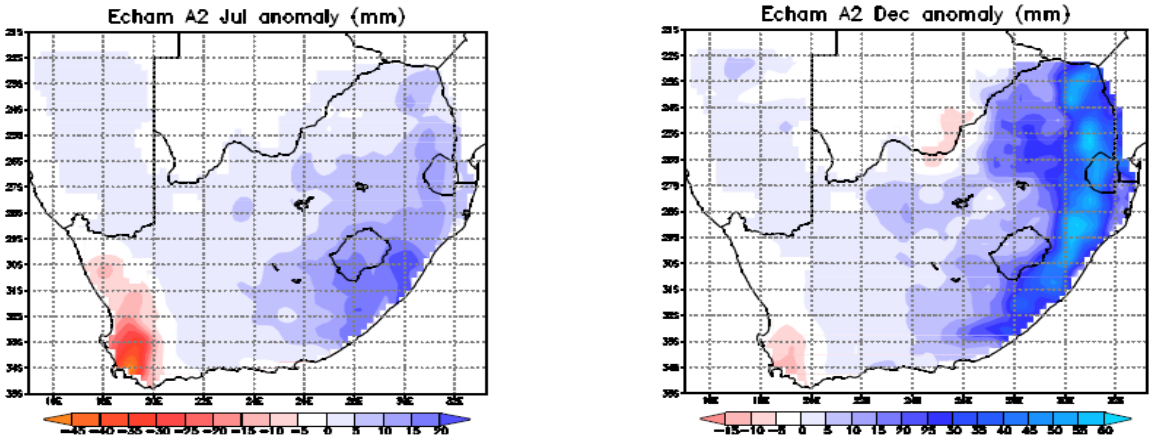


Figure 4.2: An example of a 2050 projected change in total annual rainfall (mm month^{-1}) for July and December from a new generation GCM used in the IPCC AR4
(Source: CSAG as cited in Midgely *et al.*, 2007)

The scenarios show that the increase in air temperature is likely to be of the order of 1ºC to 3ºC depending on location (e.g. inland or coastal) and season, and be most apparent in the daily minimum temperature. Arid and semi-arid regions towards the western interior are very likely to experience greater increases in maximum temperature than the rest of the country. It is now clear that most of these scenarios (shown above) project drier conditions in southern Africa (IPCC, 2007; Hewitson and Crane, 2006). According to Midgely *et al.* (2007), these scenarios are useful in representing what South African policy makers could consider in their future planning.

Significant increases in the intensity of extreme rainfall events have also been identified over more than two thirds of the country (e.g. by New *et al.*, 2006; Shongwe *et al.*, 2006; Landman and Mason, 1999a; Mason and Joubert, 1998) and are broadly consistent with climate change projections. Scenarios of regional climate change remain uncertain, particularly with regard to rainfall projections. International scientific consensus even on the sign of projected rainfall change in southern Africa has, however, not been achieved. Regional downscaling approaches may reduce this uncertainty somewhat, but there is currently, a wide range of possible rainfall scenarios, especially in summer rainfall regions (IPCC, 2007b; Hewitson and Crane, 2006; Mason and Jury, 1997). Projections of temperature can be made with a far higher level of confidence than those of rainfall.

The climate projections, some examples of which are highlighted above, particularly for projections for rainfall, cannot be perfectly and accurately described. Notwithstanding these limitations there are indications for wetter climates in the east in summer, and drier climates in the west (e.g. the Western Cape) and wetter conditions for others (some parts of the Eastern Cape and KwaZulu-Natal) in the future (Engelbrecht *et al.*, 2009; IPCC, 2007b; New *et al.*,

2006 and Landman *et al*., 2005). These projections, including the possible influences of the ENSO events, could mean that the magnitude and the frequency of such natural hazards as droughts and floods in the country could be exacerbated (Landman and Mason, 1999a) with correspondingly high costs when addressing their outcomes. Evaporation is likely to increase as well due to higher temperatures as indicated earlier. This is likely to increase the incidence of drought potential, affect soil moisture and available free water, possibly even if the total rainfall of a region increases (Hewitson and Crane 2000; Mason and Jury, 1997; Vogel 1990).

Even though there is limited international scientific consensus on regional climate models, modeling studies do project a range of possible scenarios from which a range of possible impacts can be inferred (IPCC, 2007b). Some of these projected impacts are of immediate societal relevance. A projected change, for example, in diminishing water supply in South Africa, particularly if droughts increase in magnitude and frequency, could have major implications in most sectors of the economy such as agriculture and food manufacturing.

4.4 Droughts in South Africa

Droughts are also a regular feature of the weather and climate of South Africa (Appendix 1) and Southern Africa. According to the South African Weather Services (SAWS), a drought in South Africa occurs when there is less than 70% of normal precipitation. As indicated in Appendix 1, the SAWS defines drought on the basis of the degree of dryness in comparison to 'normal' or average amounts of rainfall and the duration of the dry period for a particular area (e.g. for the Eastern Province the case study area selected for this thesis, Figure 4.3). Since droughts are regarded as a regular feature of climate in Southern Africa, the assumption is that incidences of drought could be expected regularly e.g. possibly once in every three years. An

extreme drought in South Africa would be defined as that occurring over two or more seasons (Landman *et al.*, 2005).

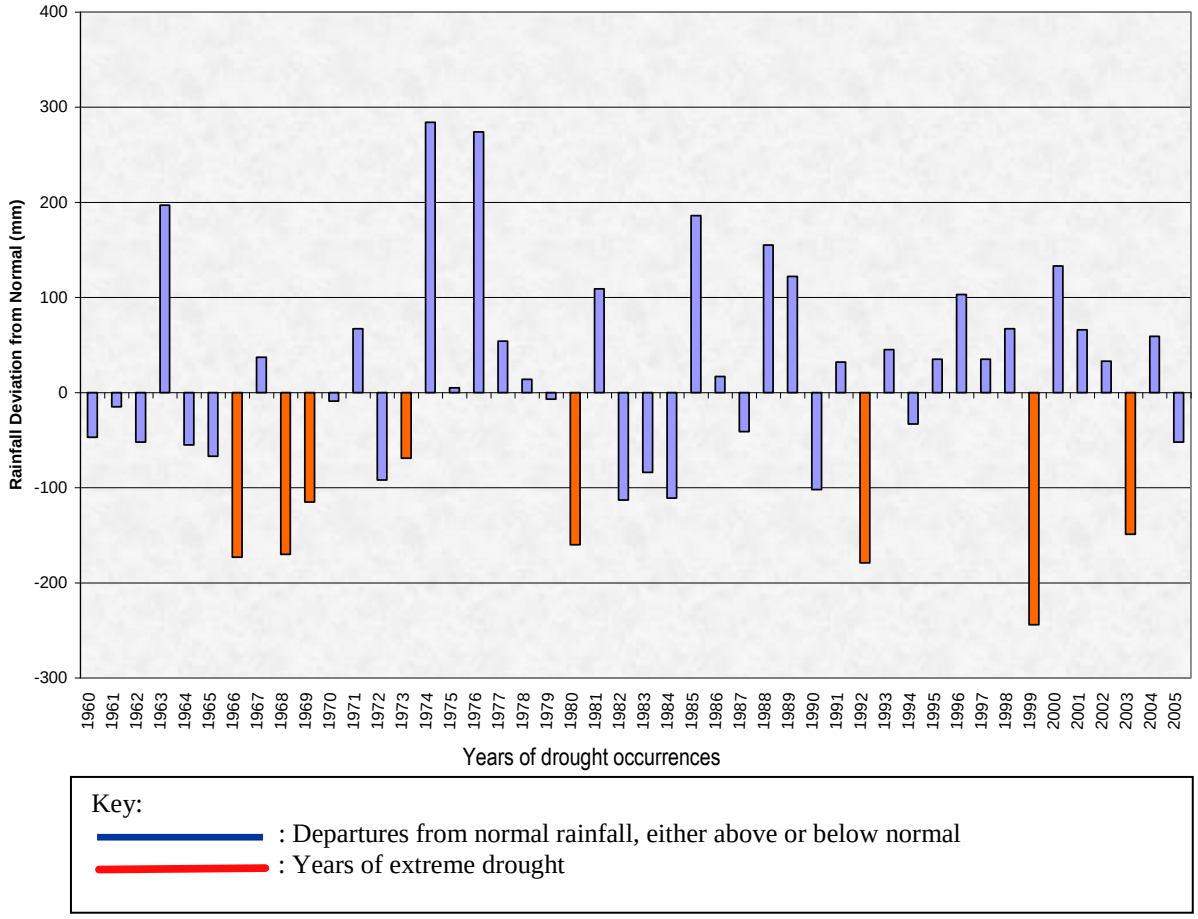


Figure 4.3: Droughts in the Eastern Cape 1960-2005
(*Source*: SAWS)

South Africa, including Southern Africa, has been recognised as a country subjected to recurring droughts of varying spatial dimensions. Some scholars, for example Sear *et al.*, (1999), have defined drought as a 'chronic problem' in Southern Africa. Bepura (1999), shows that from 1980-1996 the Southern African region has experienced major droughts during 1982/83, 1987/88, 1991/92 and 1994/95.

In South Africa, the droughts of the 1980s and 1990s, which in many areas were the worst since 1921, revealed significant weaknesses in the government's ability to respond both piously and effectively to such occurrences. This brought the local drought policy under serious examination (Bepura, 1999). The emphasis on a vulnerability focus was thus called to question and efforts were made to better understand factors shaping vulnerability. For example, the government's 1991/92 Drought Assistance Task Force revealed serious administrative and logistic deficiencies in the central and regional authority's (previously known as the homelands) ability to respond to drought, particularly regarding the provision of water and food (Land and Agriculture Policy Centre, 1993; WSTF Ciskei, 1992; WSTF Transkei, 1992).

The WSTF Ciskei report (1992, 2) for example concluded that, "the water supply in almost all the villages is critical, not due to the physical drivers of drought alone but also due to various 'human' factors, e.g. the lack of capital investment and maintenance. In many villages nothing had been improved since installation of windmills some twenty years ago when the population of the location was probably one-tenth of the present figure". The report further concluded that, "the concern is that with the increasing water shortages in the area, there will be a migration from the villages to the urban centres (p.4)". In the WSTF Transkei report (1992, 3) it was also revealed that "boreholes had been inoperable for years and some villages have never had water supply, and in some, windmills were broken". The report further concluded that "….parts of the Transkei are without doubt in a critical period of drought and unless there is some form of relief given to these people, then there will be serious consequences for this particular part of South Africa".

The drought of 2004/05 period, much like that of 1991/92, also had severe consequences in most parts of South Africa. The Eastern Cape, however, was one of the worst drought hit provinces and at the time of writing this thesis the Eastern Cape was still hard pressed by drought. Almost ten years after the release of the WSTF reports and the Drought Consultative Forum report of the Land and Agriculture Policy Centre (1993) and despite several suggestions for intervention, the repeated drought episodes continue to emphasise the need for capacity and expertise to respond speedily and effectively to this natural hazard.

Though droughts are natural phenomena, drought impacts however, as shown above, are not only climatically induced. Such impacts are also linked to other social and bio-physical causes such as economic changes, rural livelihoods, conservation practices, land care and agricultural practices (Vogel, 1994; Vogel and Drummond, 1993). Impacts of droughts can further be linked to the degree of preparedness, disaster-risk reduction and sustainable development policies when the drought strikes. Notwithstanding all the impacts of drought noted, the country still does not have a clear Climate Change Policy nor a national plan for drought management. Initial plans by differed government departments and sectors, however, have been developed ad hoc (e.g. the DWAF, the DoA and the DMC). The agricultural sector (private), for example, has developed its own Disaster-Risk Management Plan (van Zyl, 2006) which has a chapter dealing with ‘drought’ as one of the prominent hazards with disastrous consequences for the sector. Such an initiative, while commendable, still shows lack of coordination between sectors and between the private sector and the government.

4.5 Development Policies in South Africa

In the conceptual debates around adaptation and disaster-risk reduction, as was clearly discussed in Chapter 3, it is not only the bio-physical hazard that is of concern. When trying to

reduce risks to droughts, equally critical are the causes of 'vulnerability' usually framed by a range of socio-economic, cultural and other factors. It is to this mix of factors that attention now turns, particularly some of the growing efforts on enhanced and improved development initiatives in South Africa.

Since 1994, the South African Government has increasingly focused on strategies that are aimed at eliminating poverty and improving the lives of poor South Africans. Many initiatives were developed to improve infrastructures and economic performance. Most notable of these strategies, were the Reconstruction and Development Program (RDP) of 1994; Growth, Employment and Redistribution (GEAR) of 1996 and the Accelerated and Shared Growth Initiative for South Africa (ASGISA) of 2006. A brief overview of these is provided.

- The RDP was an integrated program, based on the people, providing peace and security for all, building the nation, integrating reconstruction and development and deepening democracy. These were seen the six basic principles of the RDP. This program, in 1994, was seen as a comprehensive approach to harnessing the resources of South Africa and reversing the crises created by apartheid. Some of the legacies of apartheid included inequality, economic inefficiency and very unequal income distribution and repressive labour policies. The first democratic government in 2004, made efforts to address poverty as its first priority and the RDP became a strategy to help achieve this goal. The RDP was regarded as a program that would be sustainable, achievable, and that would meet the objectives of freedom and worked towards an improved standard of living and quality of life for all South Africans (The RDP White Paper, 1994).

- GEAR was a strategy set for rebuilding and restructuring the economy within the goals of the RDP. The program was seen as an integrated economic strategy aimed at tackling challenges related to meeting basic needs, developing human resources and increasing participation of civil society. GEAR was therefore used as a tool towards gaining sustained growth. It also took into account that its success would depend greatly on transformation towards a competitive outward-orientated economy. It was envisaged that the outcome of the strategy would be a growth rate of at least 6% per annum and job creation of 400 000 per annum by year 2000 (www.info.gov.za/otherdocs/1996/gear).

- ASGISA is the current strategy that is aimed at raising economic growth to at least 6% and to halve poverty and unemployment by 2014. Recent policies are also developed and implemented with the objectives of meeting this initiative. In terms of implementation, ASGISA is seen as a nationally shared growth initiative that includes other players such as business, rather than a government's program. The aim of this strategy is also to develop opportunities conducive to more labour absorbing activities, thus reducing unemployment. The results of this growth would be shared in such a way that poverty comes as close as possible to being eliminated, labour being readily absorbed into a sustainable employment sector and new businesses being encouraged to proliferate and expand (www.info.gov.za/asgisa).

The successes and failures of the above initiatives, in particular the RDP, were then assessed by Statistics South Africa (STATSSA) in 2007 through a community survey and a report entitled 'The RDP Commitment: What South Africans Say' was developed (STATSSA, 2007). A comparative enquiry was done by STATSSA based on the population census of 1996, the population census of 2001 and the community survey done in 2007. The community survey, specifically, was undertaken to measure demographic and socio-economic change throughout society, and to monitor progress in provision of services to households. Some of the results are detailed below in Table 4.1.

Table 4.1: Comparative analysis of change from 1996-2007

	Census 1996	**Census 2001**	**Community Survey 2007**
Population	40 583 573	44 819 778	48 502 063
Unemployment		26.4%	25.5%
Absorption rate (employment)		43.7%	41.9%
Formal dwellings	64.4%	68.5%	70.5%
Piped water within a dwelling		32.3%	47.3%
Flush toilet		51.9%	60.4%
No toilet		13.6%	8.6%
Higher education on population aged 20 and above	7.1%	8.4%	9.1%
No schooling	19.1%	17.9%	10.3%
Schooling on population aged between 5 and 24	63%	69%	74%
Electricity for lighting	57.6%	69.7%	80%

(*Source*: Statistics South Africa, 2007)

The above results emanating from the data collected in the censuses of 1996, 2001 and the community survey of 2007 provide a snapshot of some of the successes that have been achieved and the challenges that still remain to be tackled. The figures show, for example, that substantial progress has been made with regard to improving the living conditions of South Africans, but relatively little perhaps on education and employment. The percentage of those aged 5–24 years who are in school has increased from 63% in 1996 to 74% in 2007, a positive step towards meeting the goal of achieving universal primary education by 2014. The continuation and completion rates to higher levels of education, however, are still low. The percentage of households living in formal dwellings has also increased and most households have access to electricity and piped water. The age composition of the population, for example, indicates that the size of the labour force is growing but there is no improvement on employment rates. The percentage of persons aged 20 years and older who have attained matric and higher levels of education is still low. This poses a big challenge with regard to skills development and poverty eradication and consequently, sustainable development for the country.

The 2001 Census data also indicated that approximately three quarters of all migration in the past decade was rural-urban, with Gauteng and the Western Cape provinces gaining and the Eastern Cape and Limpopo losing people. The consequence of this has been a rise in urban poverty as cities struggle to cope with the influx of poor job seekers (STATSSA 2007). The country's Poverty Reduction Strategy and Plan created new forms of policy development that identified poverty reduction strategies as part of the activities of all three spheres of government (i.e. national, provincial and local). This shift from a macro-economic policy to a more local market-based solution, it was envisaged, would create an enabling environment for rural development aimed at poverty eradication and self sufficiency in rural communities.

Different national departments are engaged in diverse development strategies and policies to ensure that the country is developing in a sustainable manner. The Department of Social Development (DSocDev), for example, has developed a set of provincial programs that are being implemented to improve health care, education, water and sanitation and other social welfare services in an attempt to alleviate poverty in both rural and urban areas**.** These services include financial support in the form of pensions, child and disability grants, as well as facilitating access to training and health services. The Department of Water Affairs and Forestry (DWAF) together with the Department of Provincial and Local Government (DPLG) and the Department of Public Works (DPW), are managing infrastructure programs implemented through local government institutions for the provision of water and sanitation services. Maintenance of roads, storm-water drainage and electricity reticulation are also programs targeting development of the rural areas to facilitate better access to economic opportunities for the rural poor. In many cases, however, the lack of capacity in municipalities (administrative and institutional) to ensure the implementation of these programs, and associated monitoring of service delivery, has been a serious challenge for the national government (www.dsocdev.gov.za).

As a critical step in reducing poverty, especially in rural areas, South Africa has also initiated the Expanded Public Works Program (EPWP), under the DPW (www.dpw.gov.za). Under the EPWP, all government departments, provinces, municipalities and parastatals involved in infrastructure provision are required to take steps to accelerate employment creation through their infrastructure program, where technically and economically feasible. Under this project, there will be a particular focus on relatively simple infrastructure, particularly amenable to labour-intensive methods where most additional work opportunities can be created (i.e. rural roads, local municipal roads, water and sewer pipelines and storm water drainage). There are

huge backlogs in these types of infrastructure in historically-disadvantaged rural areas where unemployment is particularly high (www.dpw.gov.za). Using prioritization processes and the IDPs, provinces and municipalities should identify those projects that could absorb a lot of local labour using labour-intensive methods. The aim of these programs is to shift from poverty reduction to poverty relief.

In 2003, following the World Summit on Sustainable Development (WSSD) held in 2002, the country also developed a response strategy to the Johannesburg Plan of Implementation of 2002 (JPOI), aimed at generating a coherent and overarching national strategy for sustainable development. In addition, the National Framework on Sustainable Development (NFSD) focuses on initiating a broad framework for sustainable development that can serve as a basis for developing a national strategy and action plans (www.deat.gov.za). The purpose of the National Framework is to articulate South Africa's national vision for sustainable development and indicate strategic interventions to re-orientate South Africa's development path in a more sustainable direction. The Framework does not present detailed strategies or actions, but rather proposes a national vision, principles, trends, strategic priority areas and a set of implementation measures that will enable and guide the development of the national strategy and action plan. The document describes in broad terms how the existing activities of government and its social partners will be strengthened, refined and realigned in a phased manner to achieve inter-related sustainable development goals relating to the economy, society and the environment, and how governance systems will be capacitated to facilitate this process (www.deat.gov.za).

According to the National Framework, sustainable development is about enhancing human well-being and quality of life for all, in particular for those most affected by poverty and

inequality. Sustainable development is viewed as 'an integration' of governance, multiple voices, processes and actions in decision-making all geared towards a common goal using set parameters and a common definition of policy choices for promoting a sustainable development agenda. The national vision for sustainable development, extracted from the South African Constitution (1996), is defined as follows:

"South Africa aspires to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration" (p28).

South Africa's vision for sustainable development is, therefore, a projection of the nation's aspirations of achieving a better quality of life for all now and in future, through equitable access to resources and shared prosperity. It places the nation on a developmental trajectory that must move society towards greater efficiency and innovation in resource use through the integration of social, economic, ecological and governance systems. It also necessitates that the other spheres of government, e.g. local municipalities, align their policies with the national vision.

4.5.1 Local development policy: Integrated Development Plans for Municipalities

Through the democratisation process, South Africa committed itself to the principles of sustainable development, including key local-level policies. Foremost was the White Paper on Local Government that aimed to institutionalize and contextualize Local Agenda 21 (LA 21) as part of a new local government system informed by decentralisation, participation and development. The key tool for developmental local government became the Integrated Development Plan (IDP) that is a legal requirement for all municipalities. The IDP is a process by which all municipalities prepare 5-year strategic plans that are reviewed annually in

consultation with communities and key stakeholders. These plans are implementation-orientated and seek to promote integration by balancing the social, economic and environmental pillars of sustainability without compromising the institutional capacity required for the implementation (DPLG, 2005).

South Africa's vision of a sustainable future may, however, be placed under threat because of impacts associated with climate change and climate variability including extreme natural events. To deal with natural disasters effectively, the government released its first National Disaster Management Act in 2002.

4.6 Natural Disaster Reduction in South Africa: The Disaster Management Act of 2002

Recognising the fact that the country is exposed to a variety of natural hazards such as floods, droughts and cyclones, including human-induced hazards such as shack fires, South Africa passed the national Disaster Management Act (DMA) of 2002. The Act (p2) calls for the following:

- An integrated and co-ordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, quick and effective response to disasters and post-disaster recovery.
- The establishment of national, provincial and municipal disaster management centres.
- Disaster-risk management volunteers; and
- Matters incidental thereto.

The Act stresses the need for South Africa to capitalise on avoidance of disaster situations and once a disasters occurs, to reduce its impacts through the concerted energies and actions of all spheres of government, civil society and the private sector. Section 23 of the DMA (7 and 8) deals with the classification of disasters in South Africa, that unless a disaster is classified as either a national or a provincial disaster it must be regarded as a local disaster. Such a

classification designates primary responsibility to a particular and relevant sphere of government for the co-ordination and management of a disaster of a particular magnitude. An organ of state in another sphere may then assist the sphere having the primary responsibility to deal with the disaster and its consequences.

The classification stated above explains the involvement of the National Departments in certain disasters. In drought-relief, for example, departments[6] that are usually involved in drought response, include DWAF, DPLG, DoA and DSocDev. What is not clear however from the Act, is the nature of assistance that should be given to the responsible spheres of government. The question that arises is whether the assistance has to be monetary only, as evidence from the past seems to suggest. Chapter 6 of the DMA outlines two principles that should be applied to funding the cost of a disaster when such an event is declared.

- Firstly, Section 56(2) of the Act states that in the event of a disaster, national, provincial and local organs of state may financially contribute to response efforts and post-disaster recovery and rehabilitation.
- Secondly, the Act assigns the responsibility for repairing or replacing infrastructure to the organ of state responsible for the maintenance of such infrastructure. Each organ of state has to incur the following costs:

    i. Development of plans, the sensitisation thereof and the reviews;
    ii. Dissemination, coordination and implementation of early warning systems and issuing of advisories;
    iii. Awareness campaigns and education; and
    iv. Research needs and initiatives.

The fundamental principle underpinning provisions relating to funding as enshrined in the Act is that all organs of state must budget for costs involved in disaster response and recovery. This principle places the onus for funding the initial costs associated with a disaster on the organs of state involved in response and recovery operations. Once budgets for response and recovery

[6] There does not seem to be a formal document that outlines who is responsible for drought management. From the budget allocation of 2004/05 from National Treasury on the government departments that received money for drought-relief (ch.5), included these mentioned above.

activities have been exhausted, the relevant organ of state may request financial assistance from national government. Financial assistance will only be provided after taking into account the disaster-risk reduction measures taken prior to the onset of the disaster. National guidelines for the classification and declaration of states of disaster issued by the National Disaster Management Centre should help reduce the incentive for provincial and local governments to declare disasters with the intention of getting financial assistance from other spheres of government.

4.6.1 Disaster management at national and local levels

Currently, the implementation of the DMA in South Africa is guided by the Disaster Management Framework (DMF) of 2005. Section 1 of the DMF of 2005 propounds the objective of establishing an integrated institutional capacity within the national sphere to enable the effective implementation of disaster-risk management policy and legislation. Section 1.1 of the Framework further discusses the establishment of effective arrangements for the development and adoption of integrated disaster-risk management policy in South Africa. This section then mandates the establishment of the Intergovernmental Committee on Disaster Management (ICDM), as shown in Figure 4.4. The ICDM must be established by the President and must include representatives from all three tiers of government. It must be chaired by the Cabinet Member designated by the President to administer the Act.

The DMF lists about 18 national departments that should be part of the Intergovernmental Committee, including representatives from provinces and local government. Whilst it is a good initiative to involve all these portfolios, it could be argued that for effective coordination, this array needs to be reduced only to key departments, also depending on the type of disaster. For a climate-related disaster, for example, major departments would be: housing, water affairs,

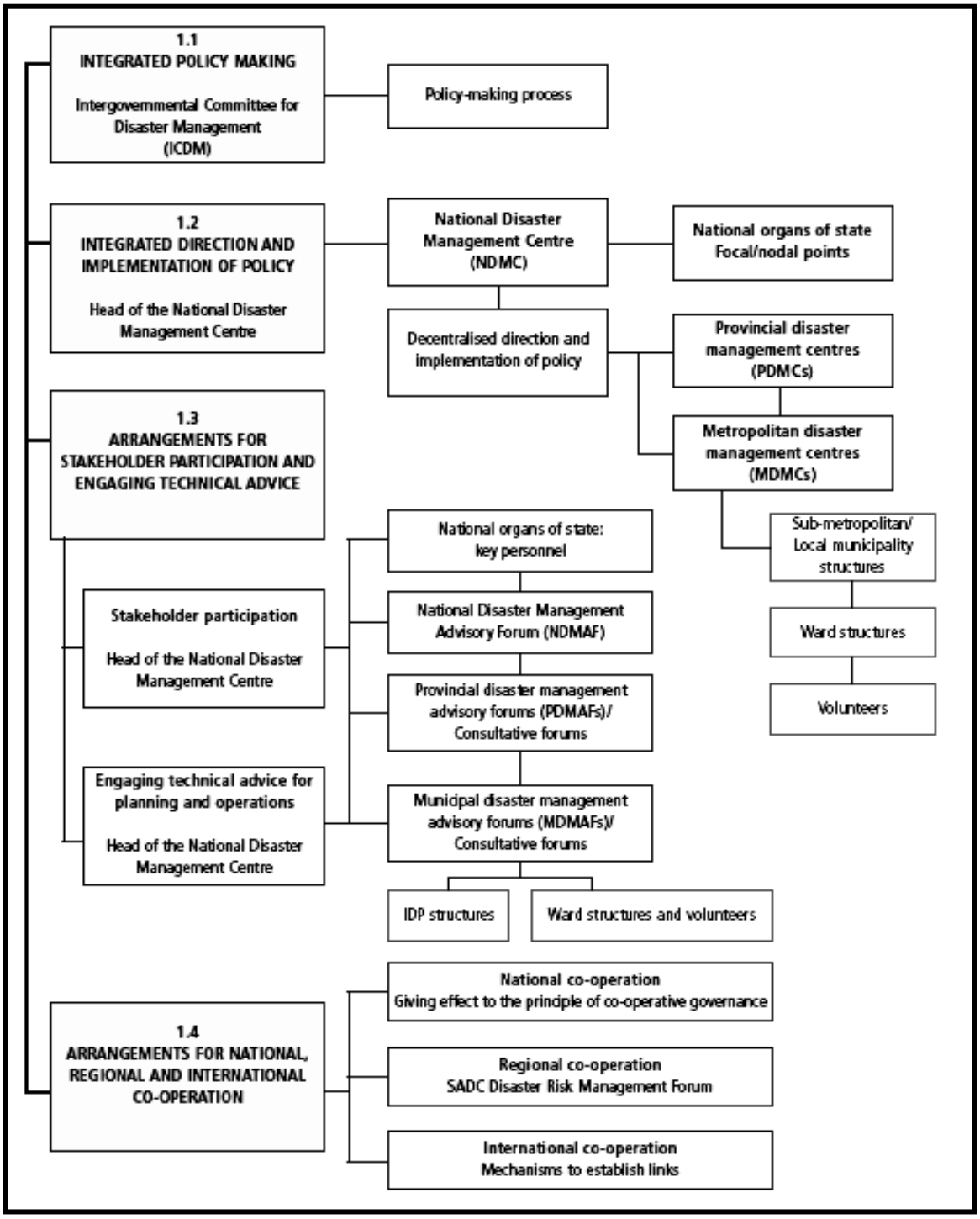


Figure 4.4: Integrated institutional capacity for disaster-risk management
(*Source*: Disaster Management Framework of 2005)

agriculture, social development and health. At the same time, there are departments that can be viewed as 'cross-cutting departments', e.g. defence, education, communication, transport and

public works, energy, health, science and technology and foreign affairs. Much as these departments are crucial, they can play a secondary role by providing key information and direct support to their respective sectors and lead departments. Thus, as shown above, South Africa has several pieces of policy in place to ensure sustainable development and to ensure poverty alleviation. Few studies, have however, tried to investigate how and whether these measures are implemented on the 'ground', particularly during times of drought. The intention is therefore, as indicated before, to understand how the principles of the DMA and DMF were implemented and either enhanced and/or frustrated local government activities and interventions for the drought period of 2004/05 in the Eastern Cape. Strongly linked to such an assessment is an understanding of the current structure of 'overarching' governance architecture in South Africa. This structure is laid out in The Constitution of the Republic of South Africa.

4.7 The Structure of Governance in South Africa as Detailed in the Constitution

According to Chapter 3 of the Constitution of the Republic of South Africa (Act 106 of 1996), the government of the Republic is constituted as national, provincial and local spheres of government. These spheres are distinctive, interdependent and interrelated. The principles of cooperative governance and intergovernmental relations within each sphere are also listed in this chapter. Some of these principles declare that each sphere must;

- respect the constitutional status, institutions, powers and functions of government in other spheres;
- not assume any power or function except those conferred on them in terms of the Constitution;
- exercise their powers and perform their functions in a manner that does not encroach on the geographical, functional or institutional integrity of government in another sphere; and
- cooperate with one another in mutual trust and good faith.

For the purposes of this study, the local sphere of government has been singled out as the most important because it deals directly with communities and local development. The local sphere consists of municipalities which must be established in the entire Republic. A municipality has a right to govern, on its own initiative, the local government affairs of its community, subject to both national and provincial legislation. According to Chapter 7 (section 151.4) the national or provincial governments may not compromise or impede a municipality's ability or right to exercise its powers or perform its functions. These functions can be summarised as follows:

i. providing democratic and accountable government for local communities;
ii. ensuring the provision of services to communities in a sustainable manner;
iii. promoting social and economic development;
iv. promoting safe and healthy environment; and
v. encouraging the involvement of communities and community organisations in the matters of local government.

It is within the mandate of the national and provincial spheres of government that municipalities play a meaningful role in the cooperative governance of the Republic. The national and provincial spheres, through legislative and other measures, must support and strengthen the capacity of municipalities to perform their functions. National or provincial legislations that affect the status, institutions, powers or functions of local government must be published for public comment in a manner that also allows organised local government, municipalities and other interested persons an opportunity to make representations with regard to the legislation being drafted.

According to Chapter 6 (section 139.1) of the Constitution, the provincial government can intervene in local government on certain issues. When a municipality cannot or does not fulfil and execute an obligation in terms of the Constitution or legislation, the relevant provincial executive may intervene by taking any appropriate steps to ensure fulfilment of that obligation including,

- issuing a directive to the municipal council, describing the extent of the failure to fulfil its obligations and stating any steps required to meet its obligations; and
- assuming responsibility for the relevant obligation in that municipality to the extent necessary to maintain essential national standards.

The national government may also intervene in provincial administration if a province cannot or does not fulfill an executive obligation in terms of the Constitution. The national executive may intervene by taking any appropriate steps to ensure fulfillment of that obligation. Now, having given this brief background on some of the South African policies crucial to this study, the next chapter presents the results of the case study, examining how communities and the various tiers of government operate together and tracks how they are supposed to operate in times of climatic stress.

4.8 Summary

This chapter focuses on some of the relevant pieces of legislation and overarching governance structures for drought risk reduction. South Africa is particularly highly vulnerable to climate change and climate variability. Coupled to this vulnerability, and as indicated in the Census statistics, the country also faces other challenges such as poverty, high unemployment rates and infrastructure-related problems. Over the past years, several policies aimed at addressing these developmental shortcomings at national level have been developed, including the RDP, GEAR and ASGISA.

The country has also developed the National Framework for Sustainable Development that sets guidance for all other policies to be aligned and framed in accordance with the national vision and objectives for sustainable development. Because of climate variability and change, the country's vision for sustainable development is severely threatened by climatic hazards. South Africa, however, has a Disaster Management Act, that outlines how the country and the responsible organs of state must and should prepare against disasters, e.g. drought periods. The structures of governance facilitating such intervention are also important in respect of how these tiers of government work together. This structure is outlined in The Constitution and each tier has specific functions to perform and if it fails, the Constitution allows for an intervention from the level of governance above.

CHAPTER 5

INTERACTIONS BETWEEN VULNERABILITY, DISASTER-RISK REDUCTION AND DEVELOPMENT IN O.R.TAMBO AND AMATOLE DISTRICT MUNICIPALITIES

5.1 Introduction

In the previous chapters, an examination of the climate change and variability, sustainable development and disaster-risk reduction nexus has been undertaken. The need for the integration of these disciplines and the need for urgent adaptation to climate change and climate variability has also been shown. This chapter presents the outcomes of the research related to themes 1, 2 and 3 (i) (as presented in Fig 5.1) that explore the links between development and climate change at the local level, including the vulnerability context shaping the coping capacity and possible future adaptive capacity to climate change in these communities. The analysis focuses first on examining development plans of the two selected district municipalities, in an attempt to see how useful these plans have been in beginning to understand and reduce vulnerability, building livelihoods and increasing resilience of communities.

This analysis is then followed by a summary of findings based on informal and formal interviews with communities and officials respectively. The aim of these interviews was to understand the coping mechanisms and emerging adaptation responses, if any, of these communities during times of drought. An assessment of responses at the institutional level, and how these institutions dealt with the drought disaster is also given.

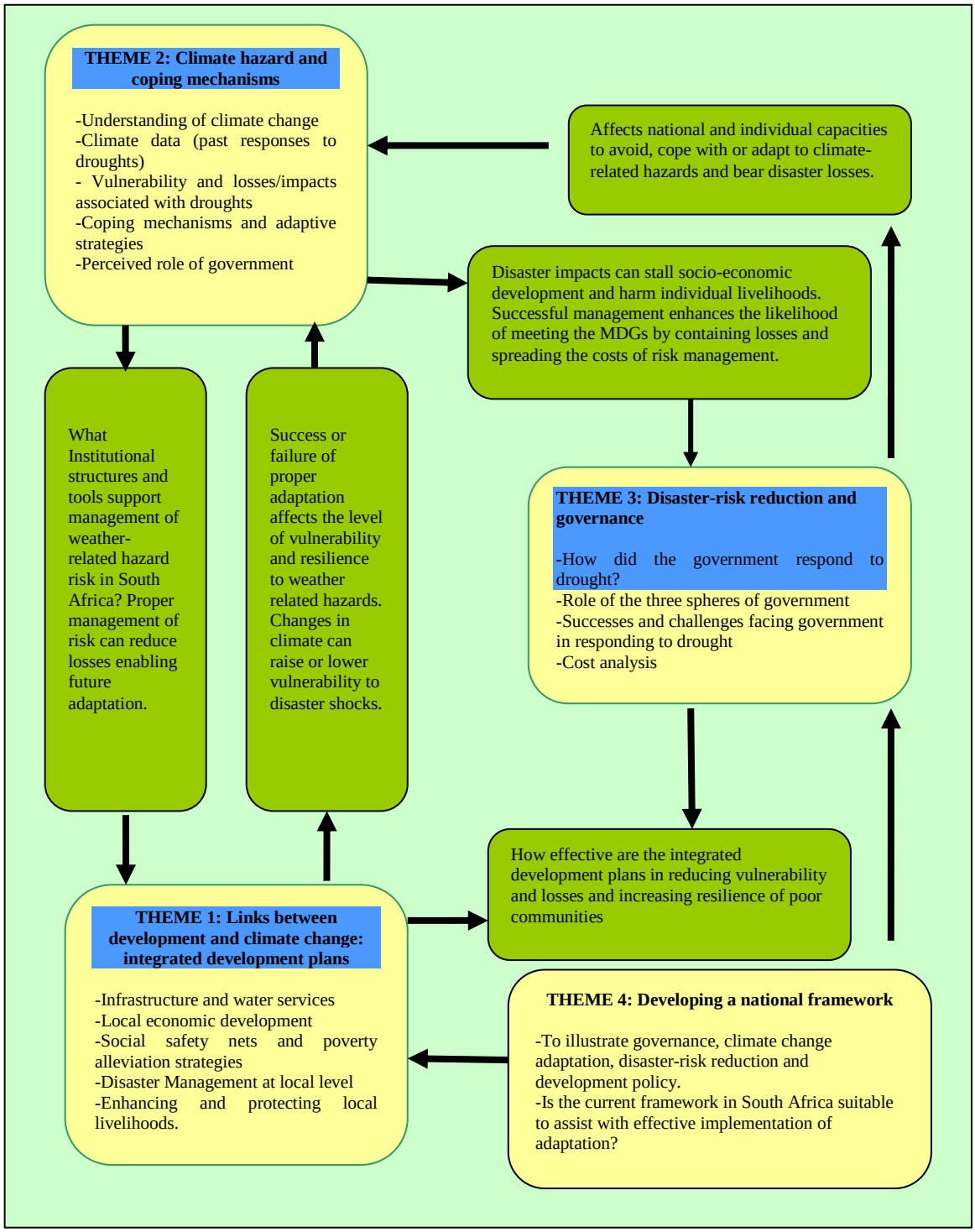


Figure 5.1: A framework illustrating the different areas of research
(Adopted from Schipper and Pelling, 2006)
(*NBB: The sections highlighted in blue are those under discussion in this chapter*)

5.2 THEME 1: Links between Development and Climate Change: Integrated Development Plans

5.2.1 Amathole District Municipality Integrated Development Plan: 2002 – 2007

Amathole DM comprises mostly rural areas. There are eight local municipalities (Mbashe, Mnquma, Great Kei, Buffalo City, Emahlatini, Ngqushwa, Nkonkobe, and Nxuba) located within its boundary. Buffalo City (East London) is a secondary city of this Municipality (Municipal Demarcation Board, 2003). The district IDP establishes the key development issues and prioritises needs at a broader strategic level for the district as a whole. The district IDP process sought to ensure alignment of all the developmental needs of the local municipalities with the broader strategic focus of the district. The priority issues that were identified by the local municipalities were grouped within five strategic clusters (Table 5.1) for the district IDP, namely:

Table 5.1: Strategic clusters for the district IDP

CLUSTER	**Priority Issues**
Infrastructure	Water/Sanitation, Roads, (Telecommunications, Electricity and Solid Waste)
Local Economic Development (LED)	Agriculture, Manufacturing and Tourism
Environment	Environment
Social needs	Health, HIV/Aids, Safety and Security, Livestock on the road, Crime, Community Services, Land
Institution & Finance	Institution, Finance

The IDP Objectives:

The objectives of the IDP, as outlined in Table 5.2 below, were aimed at:

- Extending basic infrastructure;
- Increasing economic growth through access to economic opportunities, with an increasing focus on agriculture;
- Responding to the social needs of communities with emphasis on health and HIV/AIDS;
- Developing environmental strategies to enhance sustainable development;
- Transforming the municipal institutions to meet the developmental challenges of local government.

Table 5.2: Objectives of the Amatole DM IDP

CLUSTER	ISSUE	IDP Objectives
Infrastructure	Water	Subject to refinement based on further financial and institutional analysis, to ensure that at least 90%* of the population of the district have access to an adequate supply of water in less than 10 years. By 2004: • There is an operational water sector plan for each community. • There is a fairly accurate and area specific measurement of payment levels. • Non-payment levels among those who are supposed to pay for services are reduced. • Reduce the costs of services without compromising the quality of service.
	Sanitation	Subject to refinement based on further financial and institutional analysis to ensure that at least 75% of the population of the district has access to adequate sanitation in less than 10 years. By 2004: • There is an operational sanitation promotion agent for each community. • Sanitation infrastructure investment is accelerated. • Non-payment levels among those who are supposed to pay for services are reduced.
	Roads	Subject to explicit definition of access in terms of national norms to ensure that 90% of the population has access to the road network and that the road network is maintained to an adequate condition in less than 10 years. By 2003: • There is an overall (district wide) integrated road management system incorporating a mechanism to ensure alignment of planning, programs and projects of all relevant institutions. • There is a financial framework that quantifies (and accurately costs) the backlogs and sets predictable funding.
	Telecommunications	By 2012: • Have formed a strategic partnership with a telecoms service provider to extend telecommunication coverage across 90% of the district. • Identify key sites (to be connected).
	Electricity	By 2012: • Align planning with IDP. • To supply 90% of the District with electricity. • Reduce theft. • Improve safety. • Promote environmental sustainability.
	Solid Waste	By 2012: • To establish at least 3 regional waste sites. • Build capacity for B municipalities (institutional and financial). • Establish a monitoring and regulatory body.

CLUSTER	ISSUE	IDP Objectives
Local Economic Development (LED)	General	By 2012: • Reduce the percentage of households living below the poverty line. • Increase the number of sustainable LED initiatives. • Increase the number of new jobs created. • By 2004: • Must have a fully resourced L.E.D. • Co-operation and alignment of initiatives in the district.
	Agriculture	• Establish a LED agricultural program. • Improvements to rural support services. • Clarify roles and responsibilities of support structures in terms of the delegated authority to municipalities. • Support land reform. • Entrench concept of substantiality. • Promote food security. • Reduce the percentage of rural households living below the poverty line. • Promote a commercial approach to agriculture, e.g. re-live stock. • More land to schools for gardens. • Ensure jobs are created. • Promote ownership.
	Manufacturing	• By the end of the IDP cycle, devise an infrastructure Investment program/plan that is line with LED objectives. (Incl. heavy industry, micro- industry, etc.) • By 2004, have a responsive skills development program in place. • By the end of 2002 put a formal structure in place for coordinating all agencies and spheres responsible for attracting investment.
	Tourism	• To increase the number of tourists coming to the District. • Must have a fully resourced L.E.D. Unit supporting community based tourism projects by 2004. • Establish cultural eco-tourism in the district.
Environment	General	• District Municipality to take responsibility for developing a district wide environment strategy together with the local municipalities and other role-players.
Social needs	Health	• To provide all households with access to an adequate health service through either fixed or mobile facilities by 2012.
	HIV/Aids	• A HIV/Aids program to be developed as part of the IDP to be complete by 31 March 2002.
	Safety and Security	By 2004: • Dispel the perception that the area is not safe (through crime prevention strategy, fencing of roads, community safety and security initiatives) • Reduce levels of crime.
	Safety (livestock on the road)	• Fence off roads. • Improve the effectiveness of livestock.
	Land Reform	By 2004: • Establish a district wide land reform program implemented by local municipalities • Establish effective land use management systems in the

CLUSTER	ISSUE	IDP Objectives
		district (district as co-ordinator) • Have a housing strategy in place (Link this to the provincial housing plan) • Focus on strong negotiating role with province and national department.
Institution & Finance	General	• Through transformation ensure a developmental, responsive, and financially sustainable local government.

(*Source*: Amatole DM IDP, 2002)

5.2.2 O.R. Tambo District Municipality Integrated Development Plan: 2002-2007

O.R. Tambo District Municipality is also composed mainly of rural areas and it incorporates seven Local Municipalities (Port St Johns, Bizana, Lusikisiki, Flagstaff, Qawukeni, Mqanduli and Sabatha Ndalindyebo). The O.R. Tambo District Municipality is one of the poorest in South Africa and is beset by backlogs in infrastructure development and a myriad of problems related to poverty and under development. A major concern is that the economy of this District Municipality is not adequately stimulated and if corrective actions are not taken, further decline can expected. The IDP was developed through a process which involved a simultaneous program of local and district work-shopping sessions which enabled the local municipalities to formulate a perspective of the existing situation and identify priority issues for inclusion into the broader district perspective (O.R. Tambo DM IDP, 2002). Development programs (Table 5.3) were developed for the IDP and were aimed at addressing major priorities in the region as shown below:

Table 5.3: Key issues and objectives of the O. R. Tambo IDP

Key Issues	Objectives
Social development: Moral decay/crime (safety and security)	• To reduce crime rate and moral decay by 70% in the O.R. Tambo district municipality by December 2005 • To develop Crime Prevention Management capacity by 2006
HIV/AIDS	• Increased life expectancy of AIDS victims and 20% reduction in AIDS infections by 2004 • Curb the spread of HIV/AIDS by strengthening the muscle of the stakeholders dealing with HIV/AIDS • To create awareness amongst rural communities about HIV/AIDS
Health	• Health facilities will be safe and habitable; 94% of posts have been filled and 100% of essential drugs available by 2003 • Rendering of quality environmental health services • Alignment of environmental health services
Education	• To recognize sign language as an official language within the District by 2006
Housing and settlement	• Build 15 000 houses by 2006 • Develop a Spatial Development Framework and Land Use Management System • Achieve land reform
Economic development: Unemployment	• Unemployment reduced by 1% per annum over 5 years by 2006 • O.R. Tambo to assist with the formulation of an SMME Program by June 2004
Poverty	• Poverty and malnutrition reduced by 30% by December 2005 • To render comprehensive social services that facilitate development and self reliance of communities by 2006
Tourism	• Increased tourist visits by 20% by 2006 • Expose the artists/crafters to the markets
Agriculture	• Increased agricultural development by 20% by 2006
Forestry	• An integrated forestry program by 2006
Mariculture	• Mainstream mariculture as a sector by 2006
Institutional program	• Co-operative governance and efficient distribution by July 2004 • To capture all existing data and have a fully functional/operational GIS system by 2004 • To create awareness on how the Municipality works • To make the Municipality closer to people • To unpack government program
Human Resource	• To build an integrated HR capacity building program from July 2003 • Build an effective community skills development program with effect from July 2003 • Build and maintain a comprehensive H.R. Software system • To have an evaluated and properly job graded administrative organisation • To build a co-ordinated staff transfer and redeployment plan
Financial Planning	• Increase the levy collection to 75% by June 2003 • Install adequate management controls and internal control systems by September 2003

	• To ensure adequate security of the council assets and develop and implement asset management policy by 2003 • Effective management of assets
Municipal Support and Service Centre	• Provide technical support on budget preparation, compilation of annual financial statements, submission of statutory returns, reporting to council , revenue management and general financial management • Roll out the financial management system used by the District Municipality to be able to provide effective support • Training on the financial management system and budget reforms by 30 June 2004 • Develop the service centre to a level that can provide effective systems support to local municipalities and the District Municipality by 30 June 2004 • Widen network administration to ensure uninterrupted service • Co-ordinate information for forward planning by the District Municipality on an annual basis • Develop an operational Service Centre
Information Systems	• To have a fully functional information management system by end 2004
Disaster Management	• Municipality has disaster management capacity by 2006
Environmental Damage and Degradation	• A District Environmental Management System by 2006 • Develop an Integrated Environmental Management System
Physical infrastructure and services: Access to Road Links	• All link roads to be upgraded and maintained by year 2005 • Construct and upgrade 1 500 km of gravel access roads by 2005 • Maintain at least 500 km of gravel access roads per annum
Transport Services	• Improved taxi and airfield infrastructure • All link roads to be upgraded and maintained by 2005 • Transport plan to be in place by 2005
Water Supply and Sanitation	• To have access to safe drinking water, including a reduction in sanitation related diseases • All infrastructure to be upgraded and maintained by 2005/6
Communication Networks	• 80% to have access to improved communications networks by 2005
Electricity	• 70% of people to have access to electricity by 2007
Social Infrastructure	• To build five multipurpose centres in key nodes by 2005 • The classroom backlog will have been reduced by 60% by 2006 • To promote and develop sport through the O.R. Tambo District Municipality

(Source: O.R. Tambo DM IDP, 2002)

(*NB: the financial implications of these IDPs will be discussed in detail in the next chapter)*

5.2.3 Analysis of IDPs

Though the objectives of the IDPs are categorised or clustered differently, there are common objectives in both that are crucial in reducing vulnerability and increasing resilience. From observation, these common objectives include:

- **Infrastructure:** this objective deals specifically with the provision of basic services and physical infrastructure. The aim of this objective is to ensure that communities in these areas have access to safe and clean drinking water, including proper sanitation services. These services are crucial in reducing sanitation related diseases, such as cholera, which are a common threat to these communities.

- **Social programs:** aim at addressing key areas of poverty, HIV/Aids, gender, housing, social facilities, primary health care, land reform and safety and security. Agricultural projects and tourism initiatives are also proposed as to alleviate poverty. An HIV/Aids program is included as the pandemic is seen as a growing concern. In several critical areas the initial projects would take the form of planning in order to identify and prioritise required development projects.

- **Local Economic Development:** aims at the reduction of unemployment, poverty and malnutrition. In O.R. Tambo DM, for example, an LED Unit is designed to be established that would assist communities in agriculture and promotion of tourism as the key sectors in the municipality.

- **Institutional Program:** This is intended to achieve a proper organisational structure within both District Municipalities. The institutional program for the O.R. Tambo DM is even more detailed compared to that of Amatole DM. In O.R. Tambo DM, this program, is envisaged to promote cooperative governance, efficient service delivery and will close the gap between the municipality and communities. This also includes capacity building for officials and councilors, to assist the district as well as local municipalities.

What is puzzling, however, about these IDPs, is the fact that "disaster management" features very weakly. In the Amatole DM, in fact, disaster-risk management is not even considered in its objectives. In O.R. Tambo DM, it is an institutional program that 'the Municipality intended to have disaster management capacity by 2006'. Progress on this program was indeed traced during fieldwork. Members of the communities, for example, noted that there were vehicles (4X4 Nissan Hardbodies) that were bought by the O.R. Tambo DM in 2004 that had a label

'Disaster Management' on the car doors. The number of these vehicles was estimated to be between 15 and 20. The community alleged that these vehicles were, however, used by municipal officials during weekends as well, for unofficial purposes with the implication that they were not being fully utilised for disaster-risk reduction activities that they were meant for.

Indeed the purchasing of these vehicles was also confirmed by an official at the DM offices (pers. comm, 2009). The official confirmed that the intended purpose of these vehicles was so that municipal officials are able to reach inaccessible areas during disaster times, e.g. fires or floods. By the end of 2005, it was estimated that half of this fleet of cars was not road worthy, due to cars being involved in car accidents and/or bad maintenance. When follow up was made about purchasing and maintenance of other emergency vehicles such as ambulances and fire-engines, the respondent could not give clear indications of the status of these vehicles. Seemingly, however, even though disaster management features in the IDP, it was not well articulated into actions by the O.R. Tambo DM. Follow up on these apparent disconnections between disaster-reduction and development was probed further. The aim was to understand how, in principle, local and provincial governments should prepare for disaster-risk reduction. The role of the provincial government is to provide guidance to municipalities on disaster management issues and to assist those municipalities that have experienced extreme hazards, (e.g. droughts), particularly where their coping threshold is exceeded. The respondent indicated that on several occasions, the provincial office has called workshops for district municipalities to assist and guide them in developing their disaster management plans.

The province is always available to assist any municipality that needs assistance, especially on the drafting of disaster management plans. Some municipalities, including the O.R. Tambo DM, however, never submitted such documents to the provincial office (pers.comm, 2009).

These documents were due for submission in 2006. Amathole DM, however, submitted its disaster management plan. According to the respondent, Amathole DM is doing comparatively better than O.R. Tambo DM in disaster management issues, though it does not have 'disaster management' as a priority in its IDP. Thus, as good as the DMA is, it has not been taken seriously and is being poorly implemented by government at all levels. Such 'patchy' and poor implementation, as is shown here, does not reduce the vulnerability and lessen the exposure of poor communities to disasters such as drought.

5.3 THEME 2: Climate Hazard and Coping Mechanisms

5.3.1 Vulnerability and Exposure Drought at Community Level

The next section, through the analysis of research results, evaluates if the IDPs, i.e. the plans for development action, managed to achieve the objectives and goals they set out to achieve, and that should bolster the resilience of communities to drought risk. Research results from both the village level participatory activities and local municipality level are presented. As indicated above in the IDPs of the two District Municipalities, there are certain sectors, e.g. infrastructure and local economic development (Box 5.1) that have been designed, at least on paper, to assist communities in becoming more resilient, particularly to climate risks.

Box 5.1: Some initiatives extracted from IDPs that should have been able to increase resilience of communities

Amathole DM

By 2004:

- Must have a fully resourced L.E.D.
- Co-operation and alignment of initiatives in the district.
- Establish a LED agricultural program.
- Improvements to rural support services.
- Clarify roles and responsibilities of support structures in terms of the delegated authority to municipalities.
- Support land reform.
- Entrench concept of substantiality.

By 2012:

- Promote environmental sustainability.
- Build capacity for B municipalities (institutional and financial).
- Establish a monitoring and regulatory body.
- Reduce the percentage of households living below the poverty line.
- Increase the number of sustainable LED initiatives.
- Increase the number of new jobs created.

O.R. Tambo DM

- Poverty and malnutrition reduced by 30% by December 2005
- Render comprehensive social services that facilitate development and self reliance of communities by 2006
- There is an overall (district wide) integrated road management system incorporating a mechanism to ensure alignment of planning, program and projects of all relevant institutions by 2003.
- Municipality has disaster management capacity by 2006
- Unemployment reduced by 1% per annum over 5 years by 2006
- O.R. Tambo to assist with the formulation of an SMME program by June 2004

Poverty in both the Amathole and the O.R. Tambo DMs is very evident. The majority of homesteads are hut rondavels[7]. Some families have three to four huts, whereas some have only one. Daily experiences of the majority of people in these communities include waking every morning to perform domestic chores, as most are not formally employed. In Emahlathini, for example, men spend time looking after and tending to their livestock, e.g. milking cows and sheep every morning and herding them to protect the livestock from theft. Women's duties include ensuring that their families have groceries and food. Most women have small vegetable gardens that they till for family consumption or to sell for cash. These households are mostly

[7] Hut made of mud bricks, with a roof-top made from grass thatching, plastic and pieces of corrugated iron.

female-headed and most are elderly females. In Port St Johns, many women survive by selling bananas and avocados that grow naturally in the forest. These fruits are sold to tourists and motorists passing by the N2 main road towards Durban. But this activity is seasonal, usually occurring from March to June. Examples of various livelihood activities are indicated in Table 5.4 below:

Table 5.4: Types of families identified and livelihood activities per family in both Municipalities

	Emahlathini DM	Port St Johns DM
Type of family identified	**Estimated number**	
Single-parent headed families (employed)	19	23
Single-parent headed families (not employed)	27	14
Families with both spouses (employed)	17	12
Families with both spouses (not employed)	26	31
Families with one spouse (employed)	11	20
Livelihood activity per family		
Formal employment (teaching, nursing and other public services)	14	17
Industry / Manufacturing	10	0
Road and building construction	8	13
Domestic servants	12	11
Stock farming (only men)	18	17
Unemployed[8]	23	19
Small businesses and hawkers, including agricultural activities	15	23

What is problematic about the classification of livelihoods indicated in Table 5.4 above is the way different individuals define 'working'/ 'not working' and 'employed / not employed'. In Xhosa these terms are interchangeable. The definition of 'working' in these communities is associated with formal employment only and a monthly salary. A person, who owns a spaza shop (tuck-shop), for example, would define herself as not working despite the fact that running the shop is an activity that would keep the respondent occupied most of the day and

[8] Unemployed in this case refers specifically to individuals that are not even "self-employed" e.g. as hawkers or small traders in the informal sector.

earning some income. Some women, who provide domestic services, also classify themselves as not employed whereas some classify themselves as employed.

The distinction here is mostly based on education levels and age. The younger generation, e.g. with school-leaving and matriculation certificates, see themselves as not employed. Being employed for them means working for the government or a 'better' sector and with a higher wage compared to what they currently earn, i.e. a maximum of R800 a month. For the elderly, providing paid domestic service is employment because they have no education and therefore cannot get better job opportunities. A similar classification to that of women domestic servants is also given by men involved in stock farming. The data in Table 5.4 has therefore been presented solely on how the individuals defined themselves during interviews, regardless of the livelihood activity they were involved in.

The livelihood activities indicated above are a reflection of the poverty and hardship that exist in these communities. Compounding this hardship even further are the droughts that recur in this region. Residents in Emahlathini, for example, recalled incidents of droughts as far back as the 1960s, as well as the devastating consequences associated with these events, including:

- Lack of crop production, which led to food shortages;
- Water sources drying up, which also affected food production and health;
- Death of livestock due to hunger and lack of water;
- Diseases, most notably cholera and skin-rash outbreaks; and
- Lack of monetary income as there was no crop production and livestock to sell.

Communities in both municipalities can also identify the noticeable changes in the present climate. Subsistence farmers, for example, recognised delays in summer rains that usually precede the planting season. They also recognised that rains are erratic both in time and space, there is either too much rainfall occurring 'all at once' or too little. There is also consensus in

that these changes are starting to affect livelihoods negatively, particularly for agricultural and stock farmers. More importantly, what the elders of the Farmers Forum in Amatole DM are concerned about is the fact that for most of the time they do not know what to expect next. The 'regular' nature of the seasons can no longer be relied on. This resonates with several other countries in Africa where decision making in 'uncertainty', in part driven by climate change, is frustrating daily livelihood activities and human security (Nyong, 2007).

Elderly residents, for example, felt that in the 1980s and 1990s there were droughts, but they could withstand these droughts and they could 'bounce' back and slowly recover, partly because the then government provided major assistance to them (see reasons provided for changes below). In the 1990s, however, coping and recovery were said not to have been easy and recovery was not as fast, particularly when compared to previous years. Most notably also, the drought of 1992/93, occurred before water and sanitation programs under the RDP were implemented, i.e. after 1994, in this area (Skhobeni, Ndevana and Dowu villages in Amatole DM). In this particular drought case, government intervention also came too late. Some attributed this lack of action on the part of the government to the political transition of that period, as the country was preparing for its first democratic elections.

Notable also, is that the livelihoods of the subsistence farmers seems to be worsening so much that some small-scale farmers are no longer engaged in agricultural activities anymore partly because of the unpredictability of the climate. When they were asked why the recovery from the 2004/05 drought was more difficult, a number of reasons, which can be clustered into two broad categories: failed or poor development and exposure to hazard; were given, as shown in Box 5.2 below:

Box 5.2: Reasons given by communities on drought recovery was difficult

Failed or poor development and interventions

- Young people are not interested in stock farming and agriculture anymore.
- There is a relatively low percentage of economically active people still residing in these rural areas. The older people cannot successfully perform subsistence farming activities anymore because of poor health.
- There are no suitable government drought interventions. Sometimes there are interventions but they are misplaced.
- Many people in these communities largely rely on pensions and child grants. The pension money is just enough for food and medical supplies. They cannot afford to buy agricultural supplies anymore, which at some point used to be subsidised by government.

Exposure to hazard

- Different types of disasters have been co-occurring or following each other, frequently (e.g. droughts, floods and veld fires) and the impacts of these have become compounded over time.
- Before these communities usually had time to recover from a previous disaster, now another drought usually occurs close on the heels of a previous drought thereby amplifying previous disaster impacts. Such disasters include tornadoes, veld fires, floods and snows.
- Impacts from these disasters are also worsened by prevailing situations and various vulnerabilities. Some of these impacts are recorded in Box 5.3 below.
- There is less rain than there used to be and sometimes very high temperatures that damage crops.
- The weather has also been very unpredictable, especially in the 1990s. As one resident indicated, *"We can no longer predict when the rains will come. We just have to sit and wait, and when they do come, we do not know what to expect. Sometimes they result in floods and sometimes it's just not enough"*.

Box 5.3: Reported impacts of other disasters in the area

Development-linked vulnerability drivers:

- People cannot go to work (in particular hawkers).
- Some of these areas are still using the bucket system for sanitation. During flooding this becomes a health hazard as sewage is washed away by flood waters and sometimes resulting in bad smells.
- There is also fear of an outbreak of diseases such as cholera and diarrhea and how people are going to cope should such arise.

Hazard and exposure to risk:

- Children have to miss school. Tornadoes are sometimes so severe that school buildings are destroyed by strong winds.
- If there has been a shack fire, people are left with nothing and have to depend on government aid, which sometimes takes time.
- Parents also feared for the destruction of small vegetable gardens with crops followed by malnutrition in children.
- Destruction of infrastructure, especially roads, mainly as a result of floods and tornadoes.

General disaster impacts:

- Veld fires have a considerable impact on stock either animals get burnt to death or for those that live, the pastures are reduced drastically.
- Respiratory problems prevail long after the veld/shack fires have been extinguished.
- Injuries and deaths are sometimes reported, especially during flooding and fires, and of late, lightening strikes.
- Living in fear, anxiety and misery because of an uncertain future.
- There tends to be considerable loss of other domestic animals such as chickens.
- At times there is loss of furniture and other household possessions.

Droughts, resultant water shortages and consequently, food insecurity, seem to be the most identifiable stresses associated with climate variability in these areas. The water shortages, most often associated with droughts, are identified as having negative impacts on households as people ended up using dirty and contaminated water from the river. Also the communities indicated that they also have to share this water with livestock. The residents argued that

livestock contributed to the depletion of the inadequate water reserves available. The water shortages are also cited as contributing to food insecurity as the communities are restricted to planting certain crops, especially vegetables that demand a lot of water. The negative spin-offs of this situation can include malnutrition and increased poverty.

These communities are clearly very aware of their environment, how it is changing over time and also what they may need to become more resilient to drought periods. A specific question was then asked for these communities was to share what forms of assistance they may need from government during times of drought, and any other disaster that hits them. Some examples of responses given were as follows (Box 5.4):

Box 5.4: Interventions needed by communities from government

Hazard specific responses

- Trucked water supply could have been used as a temporary measure. In both district municipalities, there was no assistance with water supply during the 2004/05 drought period;
- Monthly supply of food parcels during the drought period;
- Training on how to take care of their animals during drought (specifically on immunisation against diseases);
- Assist with the supply of animal fodder;
- Education or capacity building on what impacts to expect from drought and how to deal with such impacts; and
- Related to other hazards such as fires that linked to drought in some cases, communities suggested other services that must be made available, e.g. ambulances and more clinics.

Development and reduction of vulnerability

- Provincial and national governments should make sure that local municipalities make service delivery to poor communities a priority;
- In some areas, where there is water supply, proper maintenance of this water infrastructure is a necessity. Some taps had not been working for over three years in some areas (e.g. in Menteku, Port St Johns).

(Most notable, however, is that none of these residents said they require money from the government as part of drought-relief; and as will be shown later, this was the intervention that was given - money is what they received from the national government for drought-relief).

Besides the stress-inducing impacts associated with climate change and climate variability, there are other problems or stresses in the municipal administration that seem to exacerbate the vulnerability and plight of these communities. Communities have to cope with the following additional stresses as well:

- Lack of provision of basic services by the municipality;
- Lack of skilled personnel from the municipalities and within the community that could assist in an emergency;
- Hospitals and clinics are poorly resourced and badly managed;
- Emergency vehicles, such as for police, fire and ambulances are very few because they are not well maintained and as a result many vehicles are not working;
- Municipality taking a long time to respond to community emergencies;
- No creation of new job opportunities;
- Absolute poverty and high food insecurity; and
- High levels of illiteracy and therefore no skills that could be economically useful in diversifying the economy.

Because of these severe shortcomings as outlined above, communities have also had to develop and strengthen their own coping mechanisms so that they do not rely too much on national and local government assistance.

5.3.2 Coping Mechanisms and Adaptation to Drought at Community Level

Coping responses to periods of acute droughts are frustrated by a number of interacting stress factors. Unemployment, for example, has 'ripple effects' compounding other stresses in the villages. For example, unemployment leads to the inability to buy food and can prevent children attending school (e.g. inability to pay school fees). Responses to the questionnaire therefore seemed to suggest that as much as the communities seem to be aware of the changes and stresses that affected them, including those related to climate, there is a feeling of helplessness and ignorance on what to do, how to cope and or adapt. It may be that lack of jobs and money are such pressing concerns that changing activities to cope in the shorter term and being thinking about adaptation in the longer term to climate variability and change are least

prioritised. It may also be a matter of not having access to information such that proactive changes can be made thereby ensuring greater resilience to stresses. It seemed that people just lived and survived from day to day, without actually recognising how they may be adjusting their lifestyles (either positively or negatively) to cope with the stresses that they face. Distinguishing between coping and or adaptation to climate stresses, such as drought, is therefore very difficult to untangle from a range of other daily survival strategies. Similar findings from Sekhukhune District in the Limpopo Province have also been presented by Ziervogel *et al.*, (2006). These findings show that in Sekhukhune there, is evidence that people are developing some coping and adaptation strategies in different ways. The crucial point, however, is that once these are known these may help provide a point of entry for effective support by local municipalities to further bolster development and hopefully resilience to times of climate stress (Ziervogel *et al*., 2006).

In answering the questionnaire, for example, most people did not respond to the question that asked them to specify how they adapted or coped in times of climate stress, may be due to lack of understanding. They tried, however, to address this question in the informal group discussions once it was explained in more depth. What emerged is that even though people in both communities are not consciously aware of it, they are coping and adapting to drought albeit in negative ways, e.g. having to reduce the number of meals from three to two a day, or eating smaller portions of food so that everyone can have food in the family. Such daily coping mechanisms may not be very dramatic, but such actions may become serious over time (e.g. malnourishment that may impact on school performance. Also most coping mechanisms identified seem to be on individual activities such as, diversifying economic activities and focussing on getting more money with few collective, community activities. Some of these activities include:

- Setting up ‘spaza shops’ (village term for a small business that sells a few daily goods to the locals e.g. salt, paraffin, milk, sugar, tea, coffee and bread);
- Registering for grants for children. It was mentioned though that there is a lot of fraud involved in this system in that the people who deserve grants do not get them and those who neither need nor deserve them do, owing to incompetence on the part of the government;
- Accessing pension funds for the elderly and this was also said to be a very tedious and slow process owing to non-possession of identification books which take a long time to process;
- Selling cattle and sheep, but this is only during December and January summer holidays and is subject to availability and demand during the season; and
- Sewing and beading and selling in town to people passing through to the town of East London (sometimes they get a project to do beading for the Grahamstown Arts Festival, but this is only once a year and it has only happened once). In Port St Johns they sell these handcrafts to tourist, mostly during holiday seasons.

In most cases, different actions are undertaken by members of the household and then allocated for various livelihood activities e.g. the women of the household obtain money to ensure that the family has an extra income during the year. For example, the money collected from the ‘spaza shop or accessed through child-care grants would be used to buy school uniforms or to pay for school fees. Although the lack of jobs and money are identified as the key household stresses, there are few actions available for people to respond to these stresses directly and those that are available tend to be short-term coping strategies rather than longer-term adaptation type activities. Some of the coping and adaptive measures, as observed above, seem to suggest a move away from the reliance on traditional agricultural practices as a way of daily life. The communities in Port St Johns, for example, seem to focus on other ways of diversifying their economies, including taking advantage of their location and tourism. Some of the activities that they do to earn some extra income include:

- Sea-weed harvesting and selling;
- Fishing, including cray fishing and selling fresh fish in the market;
- Projects related to cleaning the beach before and after the festive season. These are usually commissioned by the Municipality but these projects are temporary;
- Proving tour guiding services to tourists on trail walks; and
- Providing horse-riding services for those tourists who would like to go on horseback.

In Port St Johns, the elderly still feel that agriculture is the key to development provided they can get suitable and effective structured assistance from government. Though there were no community-gardening projects identified in Port St Johns, some residents felt this would also be a good adaptive strategy, but cited mismanagement of funds as a problem. One interviewee indicated for example, that they have tried collective gardening projects along the Umzimvubu River with the assistance of the municipality, but this has failed because everybody wants to be in control of the project. Other problems cited include theft of vegetables when they are ready for selling and consumption, mismanagement of finances, more so by people who are not even part of the project. What this means is that these communities do not have problems solely related to making a living, they have to also deal with other problems such as theft, that compound the stresses they already have and are trying to deal with.

Notwithstanding efforts to diversify, several of the coping activities are focused strongly around single sector activities (e.g. agriculture). Thus even though the communities of Chalumnca and Dowu in Emahlathini are aware of the stresses and impacts associated with climate, the elderly people still suggest adaptive strategies very centred on agriculture and livestock farming. They do not suggest a change in this type of livelihood, but prefer assistance from the government to make their lives better by providing subsidies like tractors and other equipment, seeds for planting and medicine for livestock. Unlike in Port St Johns, it seems the Emahlathini communities do not want to abandon their traditional sources of livelihood, probably because:

- This is the only way they see as the means of survival;
- They are in a preferred, established livelihood practise with agriculture, and they do not have to learn anything new (economic diversification), especially if it is not related to agriculture and stock farming, and
- They feel too old to engage in new ventures in which they are not sure if they would succeed or fail.

In Emahlathini there are also some collective groups or community forums aimed at discussing issues that affect the community, none of these structures are identified in Port St Johns, particularly in the areas where the study was undertaken. For example in Emahlathini, there is a group called "the Farmers' Forum", which consists of members who are small-scale cattle and sheep farmers in the community. This forum meets once a month but is always available to meet in the event of a crisis. This forum comprised of only elderly men since no women or young men were seen during the consultations. This organisation was brought about because farmers realised that they are facing major problems that are affecting their stock piles, for example, not having a dip tank for cattle in the area. To have their stock dipped they have to walk several kilometres to the next village. Other issues that they discuss in this forum include water shortages and how to utilise the remaining reserves, such as grazing lands. They also discuss livestock diseases and livestock death with a view to find solutions on how to deal with these problems as they arose. There are, however, no regular interactions between this forum and the provincial or local government. Such an interactive, 'boundary' platform could be a useful platform that government could use to interact with communities and to get a better insight into the problems they are facing.

The findings discussed above are, therefore, a testimony to what seems to be heightening impacts and vulnerability to change in these rural communities. These communities live in absolute poverty, and in areas that are extremely underdeveloped, e.g. no proper infrastructure, no health facilities and poor housing conditions. To further heighten their vulnerability and exposure, the municipality is also not well equipped to deal with or respond to emergencies. Distinguishing between the role and agency of the community and that of the local government is, however, exceedingly difficult. At the time of finalising this thesis issues of local municipal service delivery and the role of local government was key for the local municipal elections

(May, 2011). Thus while it is intriguing to consider the lived experiences and views of communities and their coping capacity the complex reality shaping such issues falls outside the remit of this thesis.

Frustrations with 'empty promises' of local economic development promised under the IDPs is evident and as a result, several of the economically active population has left for bigger cities in search of better employment opportunities. These communities are largely composed of the elderly and young children, who mostly depend on grants for income. Their daily activities are centred on agricultural activities such as subsistence and stock farming, just enough to support the families. These agricultural activities are also under severe threat during drought, that has been recurring in the Province, such that these communities have noted that recovery and coping is getting harder and impossible. Water supply sources are diminishing, for example, and these shortages threaten food security. The drought impacts are further compounded also by other impacts resulting from other hazards such as floods, tornadoes, snows and veld-fires, which are also common in these areas. Under the circumstances, therefore, the role of governance in responding to such situations becomes very important and requires much more extensive investigation to do justice to such issues (see for example, Adger, 2001)..

5.4 THEME 3(i): Disaster-risk reduction and governance

5.3.1 An analysis of Disaster-Risk Responses from Key Stakeholders

Research at higher institutional levels in the areas of investigation was the most difficult (and almost impossible) to undertake, especially with the local government officials, e.g. Port St Johns Local Municipality and O. R. Tambo DM. There were difficulties in accessing information and documents that are, for example, mentioned under IDPs (hence it is so difficult to verify whether these documents exist or not). Also there were difficulties in

locating provincial and local government officials for interviews as they were either very busy or unavailable. Cooperation at national level and associated institutions was comparatively better. National departments could not, however, provide any detailed information pertaining to or account for what happens at the local level; despite the call for this integration in the DMA. This is probably possible, because of the structure of governance (discussed in Chapter 4) that is outlined in the Constitution of the Republic of South Africa.

This is so because most national departments are not implementing agents. They dominantly focus on drafting national legislation that is expected to filter down to municipal level. All the interviewees from the national governments indicated that once policies are approved by cabinet, these are then work-shopped to all organs of state, including municipalities. The national government does not have much to do with policies at provincial and local levels. These lower tiers of government are responsible for compliance. In cases where a policy is crucial, e.g. the DMA, sector workshops are held, specifically directed at the affected organ of state.

The community interviewees in both district municipalities indicated that institutional involvement, particularly local and national government is important as it can provide various interventions, e.g. advice and education and training free of charge, e.g. either before or during times of emergency during a flood or a fire. Other types of interventions of a more proactive and sustained type for vulnerable groups and poverty stricken communities (e.g. cash transfers, social transfers, the role of safety nets) may also be useful. These are heavily debated in the literature (see for example Devereux and Vincent, 2010), and would clearly require considerable institutional involvement. Such interventions were not very evident in the areas

investigated. It is acknowledged that this merits further investigation, but it is beyond the scope of this thesis.

The private sector also needs to be involved in helping communities, but many residents felt that the private sector cannot be involved in helping people if the government (national, provincial and local) does not lead by example. The 'lack of commitment' from the national government is seen also as another obstacle to private investment, hence contributing to the lack of job opportunities and local development in both areas. Port St Johns, however, has fared comparatively better than Emahlathini. The DEAT, through its promotion of the Wild Coast Corridor area as a popular tourist spot has invested money over the years in an attempt to promote tourism in Port St Johns. According to the communities, this project did not go further because the local municipality was not proactive enough and failed to take ownership of the project, as a result the project collapsed.

There were very few respondents (e.g. officials representing government) who could actually answer effectively on issues of governance e.g. how government functions and intervenes during drought periods on local livelihoods. It seems most respondents are not aware of the existing structure of governance in South Africa. Most people indicated that they only know the local municipality and national government. The basic understanding is that the local government is responsible for service delivery and the national government is responsible for giving money to the local government to provide basic services to communities. The provincial government is seen as being an almost 'non-existent' entity. Some of the respondents' understanding and opinions on governance (without any hard evidence) were as follows:

- There is no visible governance structure in South Africa, municipalities are misusing state funds and municipal officials are corrupt;
- The tendering system is very flawed in local municipalities, and the provincial and national governments are not acting on this misbehavior. Municipal officials are

giving tenders to their friends or to their own companies hence there is no service delivery;

- The provincial government is, on its own, in disarray and dysfunctional, therefore it cannot solve municipal problems;
- The national government officials do not visit communities to confirm if they receive the basic services that they require. For the community to be heard, they must go on strike first;
- There is no monitoring and evaluation of service delivery in local municipalities by national and provincial governments; and
- There is very poor maintenance, if at all, of the existing services that are also important to local communities, e.g. clinics, hospitals, schools, roads, drainage pipes, and water taps.

These results, thought largely perceptions, revealed and unveiled an important missing component in governance and local development in South Africa, the monitoring and evaluation of government revenue and expenditure, development projects and government personnel handling that revenue. This monitoring and evaluation is fundamental for effective sustainable development and climate change adaptation.

The next chapter addresses the second part of the third theme (costs) and the fourth theme of the study (i.e. disaster-risk reduction and governance, including the existing framework of integration that is currently operating for drought response in South Africa). It is an attempt to explore in further detail, institutional responses to disaster-response (droughts), particularly from a national level, including an assessment of drought-related costs at national level. As adaptation is still a growing field, costing of climate change impacts is also becoming equally important. Costing of impacts will enable a comparative analysis of the effectiveness and cost-benefit analysis of adaptation options versus other response measures, such as relief funds. Such costing, moreover, is important in the decision-making processes of the government in the long-term.

5.5 Summary

In this chapter, an analysis of results of the first two themes as indicated in Fig. 5.1. was discussed, examining the vulnerability context and coping mechanisms of the communities investigated. Certain issues from the Integrated Development Plans of the selected municipalities were also presented in order to assess development priorities of these municipalities. Under IDPs the aim was to elicit what is planned under development that could and should aid in decreasing vulnerability, building resilience and mitigating disasters. Unfortunately, findings in this theme from the local communities indicate that development, as planned in the IDPs is not very visible / evident to communities. People complained of a lack of development and delivery of basic services in their villages. This could not be followed up with the senior officials of the local municipalities as they were not available to respond to issues of poor service delivery. Those available excused themselves by indicating that they cannot give any account or tangible evidence since it is not their area of responsibility. This lack of service delivery ethos, including other factors such as population demographics and multiple hazards, have heightened the plight of these communities to drought and continues to frustrate local governance in these areas.

CHAPTER 6

DISASTER-RISK REDUCTION AND COOPERATIVE GOVERNANCE: AN ANALYSIS OF COSTS

6.1 Introduction

As indicated in the previous chapter, notions of governance are poorly understood by local communities particularly those spheres of governance that impact on drought-risk reduction and drought 'adaptation'. This chapter responds directly to themes 3ii) and 4 (as shown highlighted in figure 6.1 below), providing an analysis of drought-relief costs related to disaster-risk reduction and disaster response using, as an example, the 2004/05 distribution of drought-relief funds. As a first step, an examination of costs related to drought response is undertaken. This is by no means a cost-benefit analysis, but rather an initial, comparative exercise based on expenditure figures available in the IDPs, the database from the DWAF and the Budget Speeches of 2004 and 2005 on how the national government departments respond and deal with drought disasters in the country.

This is followed by an illustrative framework that shows how government departments and tiers of government interact to respond to drought. The aim of this framework is to begin to reveal the existing structure of operation during a drought, and hence possible areas that need strengthening so that disaster-risk may be managed effectively. The following section, however, starts by examining some of the costs of climate-related events in South Africa before focussing in on first-order drought costs.

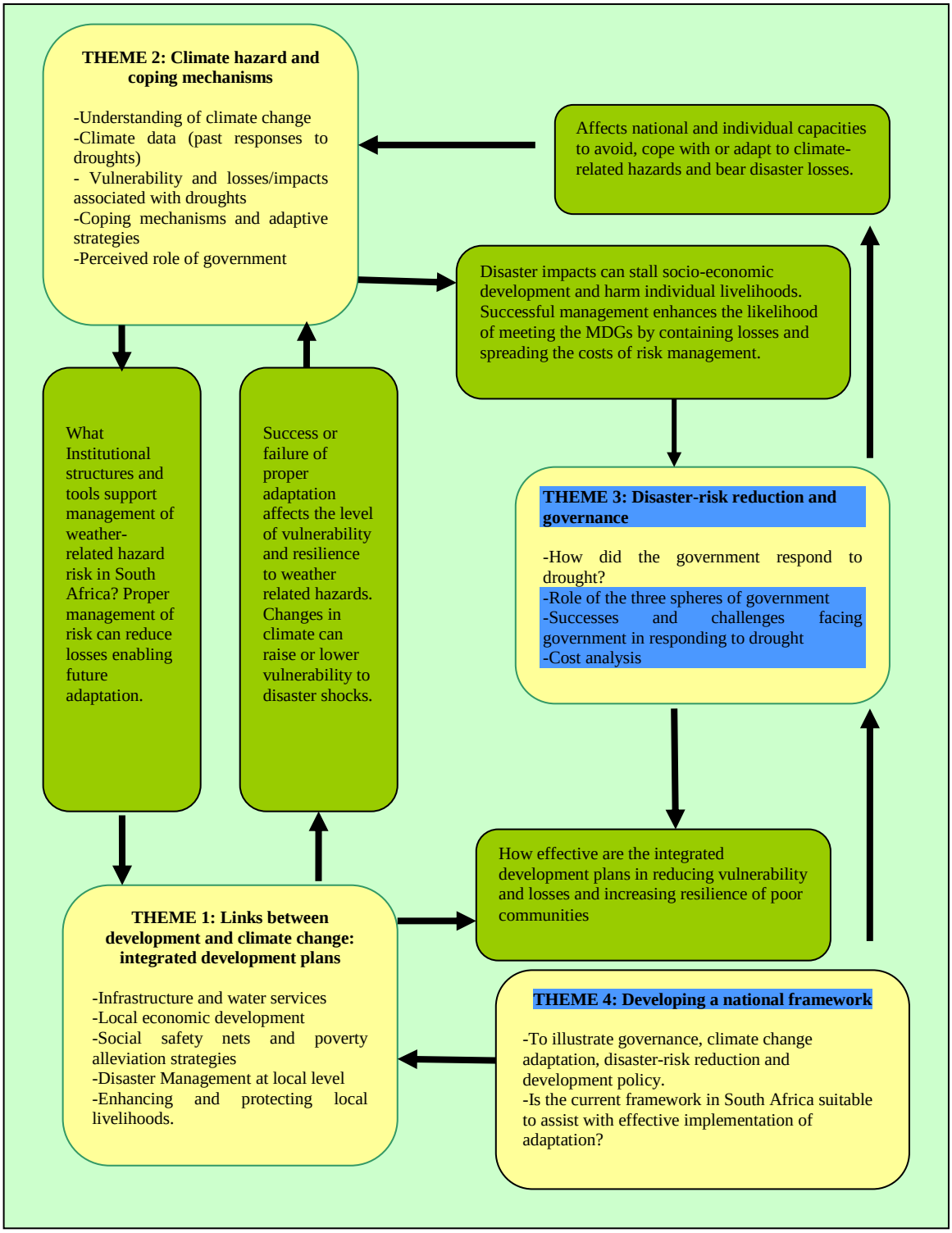


Figure 6.1: A framework illustrating the different areas of research
(Adopted from Schipper and Pelling, 2006)
(*NBB: Sections highlighted in blue under discussion in this chapter*)

6.2 THEME 3(ii): Disaster-risk reduction and governance

6.2.1 Some Indicative Costing of Climate-Related Events in South Africa, 2002-2007

As highlighted earlier, very few studies both globally and in South Africa, have attempted to quantify the costs of climate impacts, and cost-benefit calculations of interventions are even fewer. The Disaster Mitigation for Sustainable Livelihood Program (DiMP) at the University of Cape Town, for example, has done detailed studies on floods, factoring in the economic losses incurred by both the provincial, national, and local governments and some community losses as illustrated in Table 6.1 below.

Table 6.1: An example of flood disaster losses in the Western Cape

Year	**Event and place**	**Estimated economic losses**
2003	Cut-off low, 22–25 March in Montague	R212 422 663
2004	Severe storm, 05 August in City of Cape Town	R4 306 220
2004	Cut-off low, 22 December in the Central Karoo and Eden	R2 3000 000 (excludes disaster-relief from national)
2006	Cut-off low, 24-27 August 2006 in Eden	R509 763 497

(*Source:* DiMP, *www.uct.egs.ac.za*)

Midgely *et al.* (2007), also attempt to give a general estimate of the potential costs of impacts of natural disasters (Table 6.2), including the costs of the drought of 1991/92. These costs are based on two main assumptions. The first assumption is that of damages due to inaction as a result of low adaptive capacity through human and financial constraints. The second is based on an attempt to assess climate impacts in the relatively few sectors in which climate impacts have been estimated, such as water resource planning and the conservation of biodiversity. A number of other sectors that could have incurred secondary impacts have not, however, been estimated. The costs on health and livelihoods, for example, are difficult to estimate, given that there are multiple influences and impacting factors. It is very important, therefore, to note that these figures are just estimates of costs of impacts and NOT adaptation costs, as an impact cost

for a disaster loss is not a risk-reduction cost for future adaptation (See for example, earlier discussion in Chapters 1 & 2).

Table 6.2: Estimated magnitude of costs of damages due to natural hazards

Impacts (historical)	Magnitude of costs
Flood damage events in the Western Cape due to extreme rainfall events in 2003, 2004, 2005, 2006 and 2007, all caused by cut-off low pressure weather systems.	100's of millions of Rands /event with accumulated losses - R 1 billion.
Coastal storm damage along the Durban coast due to extreme weather event (2007).	Infrastructure costs in greater Durban - R100 million.
Forestry losses during 1991/92 drought (Forestry South Africa).	R 450 million.
Forestry losses due to wild fire in Mpumalanga and KwaZulu Natal.	60,000 ha of plantations destroyed worth R 500 million. R70 million of sawmilling infrastructure and assets destroyed.
Drought impacts on agriculture 1983/84. 1991/92.	Dryland crops in South Africa declined to about 30% of average production, resulting in a loss of about R2.2 billion. South African GDP dropped by about 7%. Total losses to agriculture about R3.5 billion. GDP dropped about 1.8%,

(*Source*: Midgely *et al*., 2007)

Furthermore, attributing losses directly to climate stresses, e.g. drought is exceedingly difficult not least because drought as a 'disaster' is often a creeping phenomenon and is also the product of a number of intersecting development challenges. Losses incurred owing to a drought may be, for example, because of poor water development in an area and poor maintenance of water infrastructure that then compounds periods of drought-induced water stress. Similar gaps were also quite evident when trying to gather data related to the drought-relief funds of 2004/05.

6.2.2 Costs related to the 2004/05 drought

Data related to drought-loss estimations, nationally and for the Eastern Cape is relatively thin. Despite the data being discontinuous in recording, a general indication of impacts and costs as captured by the budget allocations from National Treasury is available. An indication of drought-relief funds from the National Treasury, that were announced by Minister Manuel (Minister of Finance, 2002-2009) for respective government departments is summarised below in Box 6.1 for both years 2004 and 2005. It should be noted that the DoA, though key in the findings of this study, were unwilling to participate in the interviews, particularly issues related to expenditure of the allocations indicated in the box below.

Box 6.1: An indication of drought-relief funds announced by the Minister of Finance for 2004 and 2005

Drought-relief Adjustments Appropriation Act of 2004 (pg.2)

"Appropriation of additional amounts of money for the requirements of the Departments of Health, Social Development, Agriculture and Water Affairs and Forestry, subject to the Public Finance Management Act, 1999 (Act No . 1 of 1999), there is hereby appropriated out of the National Revenue Fund for the requirement of :-

- The Department of Health an amount of R35 million (thirty five million rand) in respect of the 2003/04 financial year to fund the prevention of communicable diseases with special emphasis on malaria and cholera.
- The Department of Social Development an amount of R60 million (sixty million rand) in respect of the 2003/04 financial year to fund emergency relief to vulnerable communities.
- The Department of Agriculture an amount of R30 million (thirty million rand) in respect of the 2003/04 financial year to provide fodder for livestock to farming communities.
- The Department of Water Affairs and Forestry an amount of R125 million (one hundred and twenty five million rand) in respect of the 2003/04 financial year for the provision of water for human consumption and for consumption by livestock, as well as for security to safeguard boreholes".

2005 Medium Term Budget Policy Statement Speech (pg.11)

"Details are set out in the Adjusted Estimates of National Expenditure. I wish to highlight the following recommendations of the Treasury Committee:-

- R311 million is proposed on the Provincial and Local Government vote, to contribute to water supplies in municipalities affected by drought, and R40,7 million is for emergency infrastructure repairs in the Western Cape and Eastern Cape.
- R32 million goes to the Disaster Relief Fund administered by the Department of Social Development.
- R140 million is proposed as a contribution to the World Food Program's relief efforts in SADC countries.
- R120 million will go to the Department of Agriculture for farmers affected by drought, and a further R20 million to cover costs related to control of Classical Swine Fever outbreaks in the Western and Eastern Cape.
- R30 million is recommended for emergency housing measures".

(Source: National Treasury, www.nt.gov.za)

An analysis of drought-relief funds at national level per province, for example, is given below in Table 6.3. The money indicated in this table been allocated for water storage units and for the construction of new boreholes, from the Minister's speech on drought-relief adjustments above. In this table the Eastern Cape is rated third highest in terms of drought-relief funding allocations from the DWAF.

Of importance in this report is that even though there are some drought-relief funds given by national government, it is not clear exactly what motivated or prompted the funding allocation. Evidence drawn from the Minister's Speeches further provides little clear indication as to why some departments received drought-relief and others did not, or what determined the amounts allocated to the different departments. It would seem that the construction of boreholes for the DWAF, for example, was the major reason for this funding. Based on the premise that different sectors were affected in many different ways by droughts, the implication seems to be that drought impacts are treated as being uniform, and that there were no other impacts associated with that particular drought disaster, that also required relief funds e.g. food relief. This is indicated, for example by the various other vulnerabilities that were indicated by the communities in the previous chapter.

Table 5.3: Total Allocation of funds for first (2003); second (2004); third (2004); fourth (2005) and fifth allocations (2007) : An indication of national expenditure on drought-relief per Province

	Financial Status				Physical Progress												
Province					% Progress	Water Storage Number of Units		New Boreholes (All Boreholes)		Km Pipe Laid		KL Delivered by Water truck				Pumping Installations	
	Gazette Value	Total Transfer	Exp To Date (2007)	% Exp		Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Delivery Distance	Km/ Kl	Planned	Actual
Eastern Cape	148,226,000	146,226,000	129,818,258	89	86	934	337	403	261	7,696	211	10,000	167,321	1,300,957	7.78	156	74
Free State	22,528,000	22,428,000	13,403,367	60	49	5	10,006	60	30	11	11	720	41,262	64,116	1.55	23	18
Gauteng	29,024,000	29,024,000	28,978,933	100	100	0	0	0	0	0	18	0	9,934	81,740	8.23	0	0
KwaZulu-Natal	233,529,000	232,029,000	209,982,431	90	89	994	846	2,062	1,893	264	239	1,389,182	1,032,920	3,575,393	3.46	114	309
Limpopo	164,718,000	159,589,000	130,781,698	82	84	785	794	442	348	14,124	14,040	170,003	307,515	435,076	1.41	328	202
Mpumalanga	50,156,000	46,956,500	43,367,359	92	94	10,329	10,266	500	491	4,343	7,686	121,795	955,388	128,423	0.13	476	521
North West	110,268,000	109,736,224	98,385,113	90	89	464	639	236	182	526	531	664	864	21	0.02	183	103
Northern Cape	90,740,000	90,427,500	75,728,716	84	83	60	4	91	75	35	20	0	16,869	126,662	7.51	28	23
Western Cape	46,851,000	44,751,000	29,357,931	66	62	0	0	0	0	0	0	0	0	0	0.00	0	0
Total	896,040,000	881,167,224	759,803,806	86	85	13,571	22,892	3,794	3,280	26,999	22,756	1,692,364	2,532,073	5,712,388	2.26	1,308	1,250

(*Source*: www.bigenafrica.com/drought, DWAF)

Population affected up to 2007: 35,158,746 Population benefited up to 2007: 5,106,644

Another evident concern, as raised by one government official (2008, pers. comm.), is that departments seemed to respond individually to drought, i.e. there is no holistic approach to responding to disaster impacts. One informant indicated that the DoA, for example, has its own plan to respond to drought, which does not necessarily include or take into consideration programs of the DWAF. On the one hand the DoA, deals directly with both small-scale and large-scale farmers and does not involve local government (2008, pers.comm). On the other hand, the DWAF gives money directly to local government. This is a classical case of an apparent lack of coordination between two departments that should be working together to address the same problem (government official, 2008, pers. comm.).

As illustrated in Tables (6.4, 6.5 and 6.6) below, costs of a drought to a less prepared, highly vulnerable and under-resourced municipality can be very substantial. The allocations shown in these tables are only for one financial year 2004/05 when the Eastern Cape experienced a serious drought impacts. There are, however, some 'hidden or related impacts' that have 'hidden costs' that are not accounted for. These would be costs, for example, related to health problems, economic losses, lives lost during the disaster and overall livelihood losses (see previous chapter). These hidden or related impacts could be the most devastating post-disaster effects if they are also not given consideration. According to the DiMP (2003), the lack of consideration of these costs could be detrimental as it undermines the process of rigorous and detailed assessment of disasters that could enable a proper plan for appropriate interventions and long-term risk-reduction strategies, and therefore effective adaptation.

Table 6.4: Total drought-relief funds in the Eastern Cape per district municipality (2004/05)

District Municipality	FINANCIAL STATUS		
	Gazette Value (000)	**Total Transfer (000)**	**Exp. In 2007**
Ukhahlamba	R42 000	R42 000	R42 000 000
OR Tambo	R37 000	R37 000	R36 460 000
Chris Hani	R36 000	R36 000	R25 417 790
Alfred Nzo	R5 350	R5 350	R2 796 891
Cacadu	R12 526	R12 526	R11 686 497
Amatole	R12 250	R12 250	R11 263 081
Eastern Cape (TOTAL)	**R146 426**	**R146 426**	**R129 818 258**

Table 6.5: Drought-relief funds: Amatole DM (2004/05)

	FINANCIAL STATUS					
	Alloc No	**Gazette**	**Gazette Value (000)**	**Total Transfer (000)**	**Transfer date**	**Exp.To date (2007)**
Amatole DM						
Amahlathi LM	3	3	R1000	R1000	1.18.05	R1 000 000
Mbhashe LM	3	3	R4000	R4000	1.18.05	R3467 531
Mnquma LM	3	3	R5000	R5000	1.18.05	R5 000 000
Nkonkobe LM	4	4	R0	R0	-	R806 442
Ngqushwa LM	4	4	R0	R0	-	R136 721
Amatole DM	4	4	R2000	R2000	-	R582 307
Amatole DM	2	2	R 250	R250	-	R250 000
Nxuba LM			R0	R0	-	R0
Great Kei LM			R0	R0	-	R0
Amatole (TOTAL)			**R 12 250**	**R12 250**		**R 11,263,081**

Table 6.6: Drought-relief funds: O.R. Tambo DM (2004/05)

	FINANCIAL STATUS (000)					
	Alloc No	**Gazette**	**Gazette Value**	**Total Transfer**	**Transfer date**	**Exp. To date(2007)**
O.R. Tambo DM						
O.R. TamboDM	1	1	R1500	R1500	3.14.05	R1 500
O.R. TamboDM	2	2	R200	R200	3.14.05	R0
O.R. TamboDM	3	3	R0	R0	-	R0
King Sabatha Dalindyebo LM	3	3	R1000	R1000	1.18.05	R1 000
Mbizana LM	3	3	R3000	R3000	1.18.05	R3 000
Mhlontlo LM	3	3	R1000	R1000	1.18.05	R1 000
Ntabankulu LM	3	3	R1000	R1000	1.18.05	R1 000
Port St Johns LM	3	3	R1000	R1000	1.18.05	R1 000
Qaukeni LM	3	3	R2000	R2000	1.18.05	R1 460
Nyandeni LM	3	3	R0	R0	-	R0
O.R. TamboDM	4	4	R26 000	R26 000	-	R26 000
O.R. TamboDM	5	5	R500 00	R500 00	-	R500
O.R. Tambo (TOTAL)			**R37 200**	**R37 200**		**R36 460**

(*Source*: www.bigenafrica.com/drought, DWAF)

Sometimes, as proposed by one government official (2009, pers.comm), the consideration of a long-term and well planned strategy for disaster-relief funding is also important, particularly for sustainability purposes. Such a strategy, however, does not exist in South Africa, despite the Disaster Management Act. According to this respondent (2009, pers.comm), there is a need for a long-term vision and anticipation of any kind of a disaster, and this should include municipalities as well as involvement of local communities. As indicated in the previous chapter, these communities, however, face a range of different types of hazards, with different impacts, shaped by different vulnerabilities. Such a long-term scheme would deal not only with droughts but other natural disasters as well. The respondent (2009, pers.comm) also asserted that if there is no proper planning, disaster-relief funds are used in a manner tantamount to a misuse of 'public funds'.

An example of perceived drought allocation of funds is provided (Box6.2). In order to establish whether such claims were valid the field research of this thesis included a section on how, if at all, drought-relief funds (R60 million) from the DSocDev were allocated, used and accessed in the relevant study areas.

Box 6.2: Thousands to get drought-relief in the Eastern Cape

Thousands to get drought-relief
19/02/2005 12:44- (SA)

Johannesburg –

Nearly 20 000 people affected by drought in the Eastern Cape will start receiving aid from Monday, the Department of Social Development announced. This follows President Thabo Mbeki's declaration of six provinces as disaster areas.

"About 60 million rand in state aid is being channeled to people who have been affected by the drought in the six provinces," said provincial department spokesperson Gcobani Maswana.

Drought victims eligible for relief are those who were retrenched from farms, and who had projects that were affected by the drought, he said. Each beneficiary would receive R900.

Maswana said the national department had contracted Cash Paymaster Services (CPS) and All Pay to manage disbursement of these funds.

During the first phase only beneficiaries who lived in areas where All Pay was contracted would receive their funds, and a date would be announced later for CPS beneficiaries, he said.

Drought conditions across the country have led to water restrictions and desperate prayers from farmers and workers alike.

(*Source*: www.news24.com)

The allocation of these funds/grants to communities was investigated at great length during the research. The Municipality of Port St Johns did not qualify for these grants, but some villages in Emahlathini received the grants, including Ndevana and Dowu villages. This was the case because the whole of Amathole DM was declared a disaster area during the drought period of 2004/05. According to a Provincial Official (pers.comm.), the release of these funds was purely a national initiative and the provincial government was not involved. The national office communicated directly with the Municipality and communities through Community Development Officers (CDOs). The release of these funds by national government followed tangible evidence from the impacts of drought, e.g. loss of livestock and crops that were incurred by these communities.

To qualify for the R900 allocated per family, for example, people had to go to the district municipality offices for Social Development (Amathole DM) to apply for the grant. Applying for the grant was a voluntary initiative, particularly for those people who had incurred 'serious losses' from the drought. An official from the Provincial DSocDev defined 'serious losses' as loss of people's valuable possessions such as cattle, sheep, goats, maize crops and beans. In their applications residents had to list what they had lost during the drought as well as the estimated cost of the loss. CDOs would then go door to door verifying the information given by the applicants. Once the information had been verified and found to be correct, the names of beneficiaries would be sent to the national DSocDev office in Pretoria, which would authorize payments. When the money arrived, people were notified through their political site stewards or ward councilors to go and collect their money from the regional offices.

A community representative (pers.comm) indeed confirmed that he distributed the money to some households and he estimated that in Ndevana village (Ward 43) about 150 families received the drought-relief grant. Further detailed investigations of allocation and distribution of these drought-relief funds was undertaken in field research. The exercise was challenging in that there was an overwhelming response from people willing to answer questions on funding they received. The tendency was for the respondents to complain about the inadequacy of the grant. None of the interviewed households had anything positive to say about the grant and some completely denied receiving any kind of grant from the government, perhaps in anticipation of another pay-out. The results of the household survey (of those households which availed themselves to be interviewed) are shown in Table 6.7.

Table 6.7: Results of a household survey on the drought-relief grants given by the Department of Social Development

Response	Number of respondents
No knowledge of the grant at all	11
Adults who might have reliable information passed away	14
Yes, the household received the grant	33
Applied for the grant but it never came	18

People complained that the money was too little and could not cover what they had lost during the drought, a situation that was aggravated by the steep rise in food commodities that followed this drought period. A 77 year old elderly gentleman indicated for example, that he lost 7 cattle during the drought, and R900 is just "sweets" in relation to his loss. An ox, according to him, costs approximately R3000.

Another complaint was that, although they had been told that relief money was meant to assist with agricultural activities, the first tranche of money came 6 months after the application. Such a delay did not help much, in an already poverty-stricken community. According to an official from the District Office (pers.comm), the last portion of money only came in 2007, and some of it had to be returned to the Pretoria head office because the claimants did not come forward to claim the money. By the time they received these grants, interviewees indicated that they already had other pressing problems such as groceries to buy and school fees to settle. Some indicated that they did not remember what they had done with the money. Thus, what exacerbated the situation was that the money came too late – the planting season for maize and beans (staple food) had already passed. More significantly, the year 2005/06 was very dry with no rains, meaning that any attempts at local, small-scale crop production or even stock farming would have been unsuccessful.

When these findings were discussed with the Councilor and an official from the DM (pers.comm), they both agreed that, first of all, the national office did not do its research well, did not effectively target the vulnerable and it did not communicate properly with the regional and provincial offices to determine what was needed by the communities. They felt that their portion of the R60 million would have been better invested in a larger, more sustainable project, that would still be visible four years later, i.e. in 2008. Also officials from the provincial office felt that their exclusion from the project was what led to its "failure". For example, an official from the DSocDev Provincial office felt that there should have been a monitoring tool, to see to it that the grants were spent as directed and progress could be monitored over time irrespective of the little amounts given out. He indicated that the national office should have seen to it also, that there is an advisory committee to advise people on the best way to utilize the grants for their intended purposes and in a manner that could be sustainable in the long term.

Part of the lack of this monitoring, according to the Councilor, comes from the fact that the officers who were handling this project from the side of the DSocDev national department in Pretoria were contracted only to disburse these funds and they left immediately after the project was finished. When indeed this allegation was followed up with the national DSocDev office in Pretoria, it was discovered that the current officials could not recall or even provide documents related to the project and the person who was in charge of this project from had since resigned.

As indicated above, such relief funds, it can be argued, are not necessarily the most appropriate and sustainable means to alleviate disaster impacts (for droughts, floods, fires or any other disaster) and for climate stress over a long term. As one senior official (pers.comm) indicated, even in 2008, the DWAF was still feeling the impacts of the previous droughts and

municipalities still needed money. As was evident during interviews at Emahlathini and Port St Johns local municipalities, some community members are not even aware of the availability of relief funds from national government. It is also questionable if these funds are actually channeled towards their intended beneficiaries and purpose. Such piecemeal payments towards disaster-relief actually take money away from genuine development that could strengthen and build resilience for vulnerable communities, and hence support effective adaptation.

In the final section of this chapter some attempt at triangulating drought-relief and development costs is made. The next section tries to examine the extent to which drought-relief funds are linked (or not linked) with the IDP budgets that are aimed at the development of the selected district municipalities. Some allocations, for example in IDPs are for irrigation schemes, infrastructure and disaster management as shown in the previous chapter. The outstanding question, that was not answered and that these allocations raise is, what is the extent and effectiveness of targeted drought-relief funds? Is there a possibility of double dipping and of relief money being provided ***in addition*** to efforts originally intended to reduce vulnerabilities to drought, as outlined in the IDPs (e.g. money for improved infrastructure as indicated in the IDPs).

6.3 Allocations for Development from the Integrated Development Plans (2002-7)

Having examined relief payments made to the provinces and specifically the Eastern Cape Province and the municipalities, Tables 6.8 and 6.9 below give an indication of costs claimed by local municipalities under their IDPs. The drought allocations were done in 2004/05. Noticeable also in the budgets of the IDPs (especially for the Amathole DM) is funding related to development and disaster-management activities (e.g. disaster-management and water services) that if applied appropriately could have been used during the drought period. Evident

as well is that the money allocated for disaster management in Amathole DM in the IDP is rather minimal and finally ends in the financial year 2004/05. There is no continuity of funding in the IDP after this funding period. In the O.R. Tambo DM (Table 6.9), there is money for example, allocated for the provisioning of water infrastructure and the implementation of water services amounting to R56 511 000 at the end of 2005/06. This municipality also received R32 200 000 under drought allocations in 2004/05.

Table 6.8: Amathole DM 5 year plan

Water Services Sector Plan

Project name	Capital Costs (R000's)					Operating Costs (R000's)				
	02/03	03/04	04/05	05/06	06/07	02/03	03/04	04/05	05/06	06/07
Operating and Maintenance methodology Study	400	-	-	-	-	-	-	-	-	-
Revise Water Sector Development Plan	120	-	-	-	-	-	-	-	-	-
Local municipality Water Sector Plan Review	980	-	-	-	-	-	-	-	-	-
Feasibility of new projects	1700	-	-	-	-	-	-	-	-	-
Groundwater management plan	1200	-	-	-	-	-	-	-	-	-
New projects	0	30000	50000	50000	50000	-	-	-	-	-
Revitalise the irrigation schemes in the district.	2 500	2 500	2 500	2 500	2 500	-	-	-	-	-

Sanitation and Urban Infrastructure Plan

Project name	Capital Costs (R000's)					Operating Costs (R000's)				
	02/03	03/04	04/05	05/06	06/07	02/03	03/04	04/05	05/06	06/07
Currently committed projects	12 674	6 480	1 800	0	0	-	-	-	-	-
New projects to provide basic services in rural areas	-	10000	20000	20000	20000	-	-	-	-	-
Upgrading of urban infrastructure	-	10000	20000	20000	20000	-	-	-	-	-

Roads Sector Plan

Project name	Capital Costs (R000's)					Operating Costs (R000's)				
	02/03	03/04	04/05	05/06	06/07	02/03	03/04	04/05	05/06	06/07
Maintenance of proclaimed roads	30000	-	-	-	-	7800	8346	8930	9555	10223
Regraveling of existing proclaimed roads	30000	-	-	-	-	39000	41730	44651	47776	51120
ADM Integrated Road Management System	100	-	-	-	-	-	-	-	-	-
Local Municipal Support Program	-	-	-	-	-	200	214	228	243	260
Interim Funding	25000	-	-	-	-	-	-	-	-	-
Transport Infrastructure Roll Over	15000	-	-	-	-		-	-	-	-

Disaster Management Plan

Project name	Capital Costs (R000's)					Operating Costs (R000's)				
	02/03	03/04	04/05	05/06	06/07	02/03	03/04	04/05	05/06	06/07
Disaster management plan	70	250	250	-	-	-	-	-	-	-
Sub–regional disaster management centers	500	-	-	-	-	-	-	-	-	-
Reconstruction of disaster damaged houses	3 000	-	-	-	-	-	-	-	-	-

(*Source*: Amathole DM IDP)

(***Key**: Quite evident also in this data set are gaps that cannot be explained from the source; once again showing the difficulty of relying on economic data of this type for loss inventories)*

Table 6.9: O.R. Tambo DM 5-year capital investment program for the 2002-2007 IDP

PROJECT NAME	2001/02	2002/03 (000)	2003/04 (000)	2004/05 (000)	2005/06 (000)	TOTAL (000)
Primary Healthcare Program		R 1 550	R 1 500	R 1 500	R 1 500	**R 6 050**
District Housing Project			R 85 000	R 90 000	R 50 000	**R 225 000**
Local Economic Development Program		R 200	R 60		R 250	**R 510**
Carpentry Project		R 300	R 850	R 400	R 450	**R 2 000**
Mfundisweni Business Skills Centre		R 1 000	R 1 000	R 1 000		**R 3 000**
Tourism Project			R 100	R 200	R 200	**R 500**
Crop Project		R 700	R 750	R 850	R 1 000	**R 3 300**
Goat Project		R 650	R 950	R 1 000	R 1 300	**R 3 900**
Beef Project		R 841	R 1 346	R 1 984	R 1 109	**R 5 281**
Mhlontlo Vegetable Farming		R 450	R 550	R 200		**R 1 200**
Sorghum Farming Project		R 200	R 285	R 370		**R 855**
Maize Farming		R 1 125	R 1 125	R 1 125		**R 3 375**
Public Relations Exercise		R 18				**R 18**
Sheep Project		R 840	R 1 650	R 1 450	R 1 375	**R 5 315**
Information Systems Program		R 400	R 1 200	R 600		**R 2 200**
Construct District Roads	R 10 020 261	R 66 000	R 66 000	R 66 000	R 66 000	**R 264 000**
Constructions of Taxi Ranks and Airfields	R 700 584	R 1 700	R 3 200	R 3 200	R 3 200	**R 11 300**
Multi Purpose Centre	R 183 180	R 3 500	R 4 500	R 4 000	R 4 000	**R 16 000**
Educational Classrooms			R 6 000	R 8 000	R 6 000	**R 20 000**
Provisioning of Water Infrastructure	**R 3,480,474**					
Construction, Maintenance and Operations, Water and Sanitation	**R 1,284,600**					
Land Development	R 97 600					
Community Based Public Works Program Fund	R 37 023 000	R 34 034	R 28 696			**R 62 730**
CMIP	R 55 779 000	R 74 366	R 90 279			**R 164 645**
Implementation of Water Services (Capital)	**R 44,933,000**	**R 31 311**	**R 25 200**			**R 56 511**
Building for Sports and recreation	R 4 010 000					
Water Services Operating Subsidy	**R 14,673,000**					
TOTAL	**R 172,184,699**	**R 219 185**	**R 320 241**	**R 181 879**	**R 136 384**	**R 857 690**

(*Source*: O.R. Tambo DM IDP)

Information revealed in Tables 6.8 and 6.9 left even more questions unanswered and opened more gaps in terms of understanding the way municipalities design their IDPs. It is not clear for example, especially in the case of O.R. Tambo DM, why on this five-year plan, the water resources are the least financed activity. Money has only been allocated for 2001/02, and for the next four years, there are no activities. What about maintenance of infrastructure for example? In a drought-prone area like the Eastern Cape, maintenance of water resources should be top priority. Notably also, all of the other projects and constructions outlined in this plan, require exorbitant amounts of water for them to be successful, yet this resource has been poorly planned for. In some instances, as shown in the case of Amathole DM, it is not clear why allocations seem to stay the same throughout the following four years (no increase, and/or decrease in amount), e.g. the water services sector plan and the sanitation and urban infrastructure sector plan. These monetary figures are not accounted for, i.e. how they were decided upon, in the IDP documents.

Accurate determination of drought relief disbursements, community perceptions thereof and the whole issue of adaptation costing, as shown in this chapter is a very difficult and challenging area of investigation that still requires much further research. Of interest, however, in these emerging findings is the apparent differences in trust accorded to different tiers of governance (e.g. communities appear to express varying interest in different drought interventions – drought-relief funding, the role of cash payments and development interventions). These emerging and yet ambiguous indications from the community should be explored in much further detail particularly if appropriate adaptation in the longer term is to be achieved.

Having given some indication of the costs related to drought-relief, together with an example of a case study on how the three different spheres of government administered the disaster relief funds, the following section finally attempts to model in a theoretical way for South Africa, potential climate change adaptation, disaster-risk reduction and development interactions for one hazard, namely drought (using the example of Schipper and Pelling (2006) shown in Chapter 1, Figure 1.1).

6.4 THEME 4: Developing an Illustrative Framework of Governance

As indicated previously, adapting to climate change at a number of scales including the local, livelihood scale, will be a critically important undertaking future climate change adaptation. It is particularly important to focus on the most vulnerable groups and their livelihoods so as to build resilience to the expected changes in climate, in particular, climate variability. This requires an integrated approach that addresses multiple sectors whilst combining the knowledge of vulnerable groups as well as specialists. Whilst the government of South Africa has made significant institutional progress in creating an equitable and "secure" nation, there remains a number of challenges that need to be overcome by government institutions, especially in the context of climate change.

During field work, interviewees were requested to give at least two departments that communities saw as key in the development of their communities that could also offer assistance during times of drought (in terms of livelihoods, support during disaster and adaptation), and also to state why these departments were important. They were then requested to rate these departments on a scale of 1 to 5, depending on importance (with 1 being the least important and 5 the most important).

The results are shown in Table 6.10 below, with the most important reason given by the interviewees also indicated in the right hand side column:

Table 6.10-: List of departments and their rating by communities

National Department	Rating	Reason for rating
National Treasury	5	Natural disasters need to be on government budget
Water Affairs	5	To make sure that there is sufficient clean water during drought
Health	3	To make sure that people are fit and healthy
Social Development	3	There are few employment opportunities so people need grants, but also there needs to be more job opportunities
Provincial and Local Government	2	To monitor the work done by local government, which is not visible to communities
Environmental Affairs and Tourism	1	To keep the environment safe and clean
Agriculture	4	People need food and assistance

Currently, the management of the 'climate change adaptation portfolio' is under the DEAT (as at time of writing this thesis), which is the custodian of the Climate Change Policy. This department is not, necessarily, currently an implementing agent when it comes to adaptation. What was interesting about Table 6.10 above is that DEAT scored the lowest points on the ratings. This was followed by the DPLG, which houses the Disaster Management Policy and the Disaster Management Centre. It should be noted that ironically, these are the two leading departments in climate change adaptation and disaster-management policy. They currently however, seem not to be very visible to communities, particularly on climate change and/or disaster management. This is probably because these departments do not have any direct communication with communities, unlike for example, the DoA, the DWAF and the DSocDev.

Despite the lack of a climate change adaptation strategy for the country this thesis begins to show the range of issues that will require attention. For example, the onus, still remains with the relevant

implementing departments that actually directly experience the impacts of climate change and variability, to respond to and draw up adaptation strategies; i.e. the DWAF, the DoA, the DPLG and the DSocDev. The structure of governance is then complicated even further, as there seems to be departments that draft policy for other departments to implement, e.g. the DEAT. Using the departments listed above, the diagram below (Figure 6.2) attempts to illustrate the structure that exists and how these departments responded to the 2004/05 drought cycle.

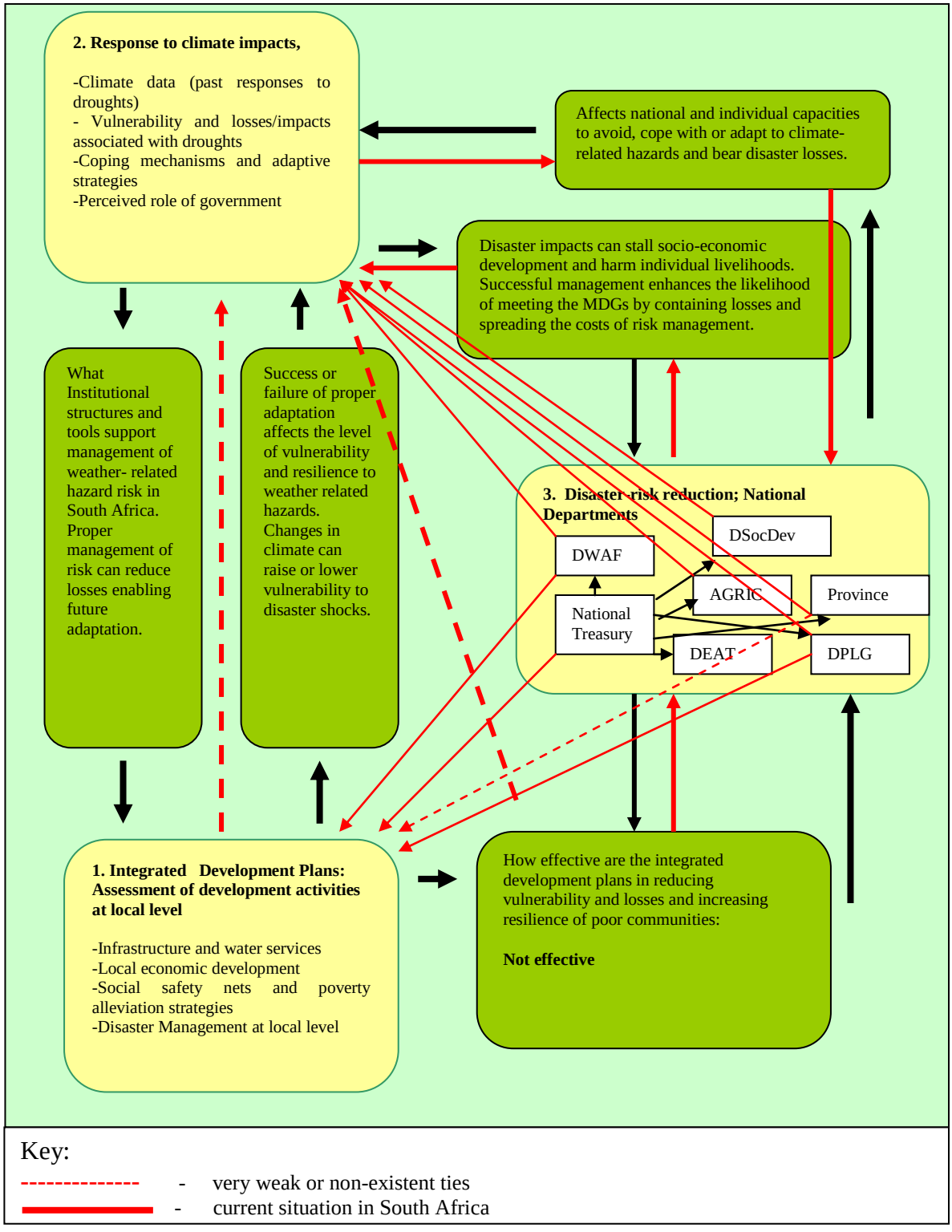


Figure 6.2: The existing structure of managing drought related events in South Africa (Adopted from: Schipper and Pelling 2006)

In the diagram above, the black arrows still indicate the original flow of inter-linkages as proposed by Schipper and Pelling (2006). The red arrows represent the current situation in South Africa. This diagram illustrates, at first glance that the structure of disaster response in the country is not a simple and clear one. There is no single direction of flow, with specific identified tasks for each department. Noticeable also is that the red arrows are pointing in the opposite direction to that proposed in the original diagram. The broken red lines indicate where there should be a strong relationship but the ties are very weak or nonexistent.

In this framework, it is illustrated, for example that, of the national governments involved in risk-reduction, National Treasury also plays a big role. As the custodian of the country's budget, National Treasury allocates funds, including those for development, to all other national departments, including provincial and local government. The DPLG, for example, has funds allocated specifically for disaster-risk reduction. If a disaster, such as a drought occurs other national departments, such as DSocDev 'then cross paths' and give some form of assistance to local government. The role of the provincial government is also not very clear, especially also in terms of its own budget. There seems to be a very weak link between provincial and local government whereas national departments have a stronger link. This structure of governance is, therefore, not representative of that which is given in the Disaster Management Framework.

In the original version of the framework, Schipper and Pelling (2006) are silent on the bottle necks and difficulties that may be experienced between themes. In reality more complex architectures will be required (see for example, Kasperson, 2010) that note that rather than simple pathways of governance messier, spider webs will be needed.

As Kasperson (2010) and Gupta (2009) has illustrated, such a 'messy set' of results (as indicated in Figure 6.2) should not be surprising in the developing world as it is clear that both the developed and developing worlds are having serious challenges with integrating climate change adaptation and development. Thus far, as illustrated in several case studies such as from Brazil and Sri Lanka, there have been attempts to do this integration, but these require time and learning by doing (Lemos and Tomkins, 2008; ISDR, 2008, Huq and Reid, 2004). The first big challenge is 'where to start' in this integration. None of this, however, implies that existing development cooperation projects should not be 'climate proofed', i.e. check whether climate change impacts will negatively affect projects and processes or checked in relation to their impacts on climate change.

Moreover, integrating these disciplines also usually entails a shift from 'traditional development' to climate-resilient development, including a deeper understanding of the benefits and costs of climate change adaptation (Vernon, 2008). Everywhere in the world, in both developing and developed countries, more analysis and knowledge is still required on understanding the expenditure requirements of climate-resilient development plans, including progress in integrating adaptation strategies into long-term development and / or sustainable development (Gupta, 2009; Parry *et al*., 2009). All of this work still has to happen in the context of the high uncertainty of future climate projections and within the current competing and urgent needs of developing countries. South Africa is, thus in the same dilemma as all other developing countries, despite its good policies.

6.5 Summary

It would appear that departments are aware of 'Disaster Management' as a concept, but the practice of disaster-risk reduction seems to be highly flawed. The different departments, e.g. DSocDev, DWAF and DoA, seem to be doing completely different things to address the same problem. There is an Act, the Disaster Management Act of 2002 that provides a guideline on how to deal with disasters, such as drought, in a holistic manner. There is also virtually no evident connection between the IDPs, which are the policy drivers for development projects of municipalities, and other development priorities of national government. It has been demonstrated in this initial study, for example, that Municipalities receive money for development, however, when a disaster such as a drought occurs, the National Treasury usually allocates additional money, this time under the guise of drought, but in the form of relief funds, again via national departments, to assist municipalities. Such convoluted flows of assistance may mean that leakage and poorly-targeted money flows may result. This can have possible serious consequences, e.g. given possible future adaptation funding allocations. Questions thus arise as to how will such disbursement of funds intersect and or support existing financial distribution flows, particularly during prolonged drought events.

The links between mechanisms to implement, track and monitor the outcomes of development policy should also be carefully interrogated, with reference to climate change. The IDPs, for example, could be used as tracking mechanism for expenditure and as a monitoring tool for development and adaptation initiatives (e.g. storm water drain development, bore-hole maintenance and development, against drought or any other emergency disaster relief grant thereby avoiding duplication of payments.

In conclusion, there seems to be very weak ties between these three tiers of government. There is no monitoring and evaluation of development initiatives. The existing structure of governance is not a very effective structure of governance for an effective and successful implementation of climate change adaptation in South Africa, particularly because it currently lacks comprehensive monitoring, evaluation and accountability mechanisms, especially at the local level. It is currently very difficult to imagine if there could ever be an effective governance structure that could aid in the successful integration of climate change adaptation, disaster-risk reduction and development. Nonetheless, this should not stop governments from starting now to reorganise and learn through trial and error and thereby trying to achieve this much needed integration.

CHAPTER 7

CONCLUSION

There is now substantial evidence (e.g. IPCC, 2007a and 2007b) that there is reason to be concerned about climate change. As demonstrated in Chapter 3, impacts associated with climate change and climate variability are a cause for concern for policy makers, particularly in developing countries. Although some benefits may accrue from climate change and climate variability, most impacts will probably be negative, particularly for resource-poor communities. The frequency and magnitude of disasters, as well as their impacts on societies, seems to suggest that the current coping and response mechanisms may indeed be insufficient to alleviate such disaster-impacts and will be woefully short if required for sustained climate change adaptation and development. Societies, especially in the developing countries of Africa (Boko *et al.*, 2007), including South Africa, are at high risk and are exceedingly vulnerable to climate change and variability, because of low and sustainable adaptive capacity.

A strong case has been presented here that there is a need to start focusing on the synergies between climate change adaptation, disaster-risk reduction and development, more so because these approaches have more similarities than differences. The linkages are, however, not straight forward and readily apparent, and need to be carefully scrutinized at various levels of governance, e.g. global, national and local levels. Considering that adaptation actions are often local, there is also a strong need to find ways to realize possible synergies between both national decision-making and local actions, as decisions made at a higher level can facilitate or hinder actions at lower level. There is, therefore, an urgent need for a more rigorous interrogation of what efforts

may be required to realise the advantages of effectively 'twinning' development and climate-risk management. It is acknowledged, however, that such investigation and discussions are not simple processes. As already indicated, sustainable development for example, is a complex concept that embodies other equally complex issues such as cooperative governance (Gupta, 2009). The persistent question remains, however: How possible will such integration be and what form should it take? Should effective disaster-response be undertaken through existing policies and/or development initiatives or should new policies be designed?

The case that is being presented here argues that adaptation that is effectively integrated with development is one appropriate intervention that could lessen vulnerability and increase the resilience of communities of South Africa through climate disasters such as drought. This statement, as it has been proved in this thesis, is based upon the understanding that vulnerability, including the ability to cope, is also linked to the social, political and economic environments that underpin and shape the lives of different groups of people. The key research questions stated in Chapter 1, that have been proposed in this study can be briefly answered as follows:

1. As much as theoretical frameworks seem to be advocating for strong linkages between these disciplines, there are currently very weak linkages in South Africa between these disciplines. In principles these linkages are good and well defined on policies, e.g. the Disaster Management Act; however, in practice they are not apparent. There are few sustainable linkages between government departments, e.g. the National Treasury, which gives money to other departments during drought periods; however, these weak ties are not able to convincingly reduce risk and vulnerability to drought, as shown for, example in the case of the Eastern Cape.

2. There is a lack of proper coordination between the three tiers of governance. Similarly, there is a strong need for monitoring and evaluation, especially for local municipalities that are responsible for service delivery to the poor communities. Implementation of policies such as the IDPs for municipalities need to be carefully monitored, including the expenditure involved thereof. Proper implementation of these policies could be useful in

> building resilience and decreasing vulnerability of the poor to natural hazards such as drought, and in the long run climate change and variability.

Using two District Municipalities in the Eastern Cape Province for the case study, the aim was to interrogate the complexity of the interconnections between climate change adaptation, development, disaster-risk reduction, development and governance. This interrogation is necessary in South Africa if adaptation is to be implemented effectively. Using drought as an example of a climate stress, this nexus between climate change adaptation, disaster-risk reduction, development and governance was carefully examined. A summary of key outcomes is given below, referring back to the objectives and themes as outlined in the research methods and illustrated in Figure 7.1 (shown below), that has underpinned this research.

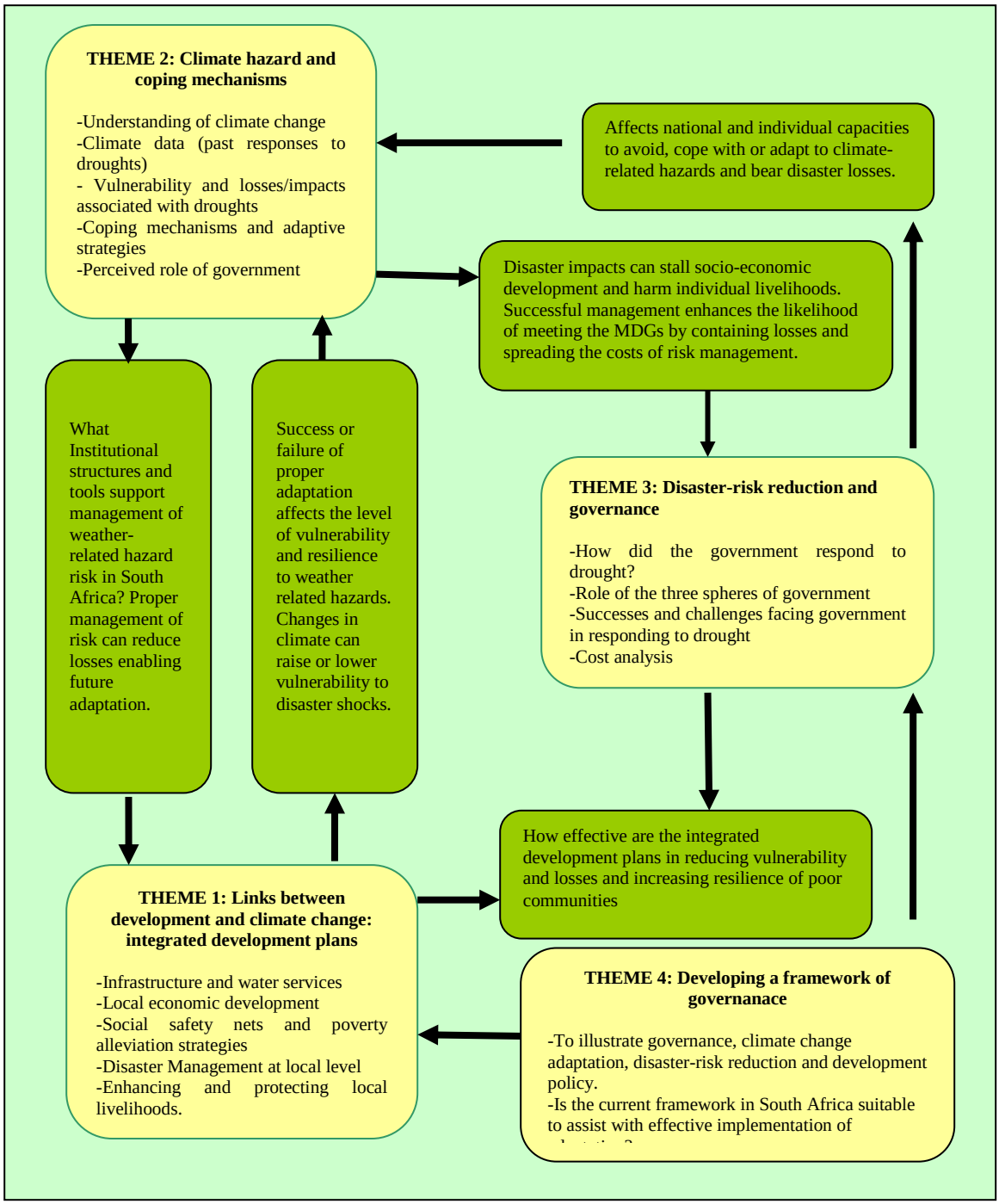


Figure 7.1: A framework illustrating the different areas of research (Adopted from Schipper and Pelling, 2006)

7.1 THEME 1: Links between Development and Climate Change: Integrated Development Plans

Objective 1: Examining, from existing policy documents, how current development plans and policies accommodate, if at all, impacts associated with climate variability, and how these could be ramped up for climate change adaptation.

Through the IDPs, local governments are the primary site for service delivery of basic needs for the people as mandated by the constitution. There seems, however, to be difficulty in both Amatole and O.R. Tambo District Municipalities in implementing their IDPs which are meant to boost development of the rural communities. IDPs alone therefore, cannot be relied upon to be used as a way of "climate proofing" rural communities against future hazards. Poverty, hence, still remains an evident significant challenge and is still largely concentrated in the rural areas that surround these municipalities. IDPs, therefore, have not been able to assist communities to reduce their vulnerability and increase their resilience against climate hazards. This serious shortcoming points to a need to further strengthen the IDP process within District and Local Municipalities. Particular attention needs to be given in IDPs to particular issues such as:

- Effective capacity building at management levels;
- Proper financial management, monitoring and evaluation;
- Decentralization of service delivery to include communities,
- Effective flows of fiscal resources, balanced with development practice evident on the ground;
- Improved ownership and implementation of the IDP process by local communities, particularly the poor;
- Effective and visible integration of National priorities (such as climate change) within IDPs; and
- Strengthening of partnerships within the local sphere of government, particularly with civil society organizations supporting the growth of livelihoods at the household level.
- There is still very poor integration of social, economic and environmental planning. If there was proper integration, for example, development in communities would be evident and communities themselves would be able to attest to that.

- In these particular municipalities, accountability seems to be lacking. Local government officials and key staff seem to lack the required skills to implement the objectives of the IDP.
- IDPs have not been used by all spheres of government to spearhead an all-inclusive way of dealing with the most pressing needs and challenges in communities, in particular the installation, provision and maintenance of basic services and the facilitation of economic growth.

7.2 THEME 2: Climate Hazard and Coping Mechanisms

Objective 2: Investigating how these policies influence, if at all, the interaction between local livelihoods, vulnerability and adaptive response strategies of communities to drought. Are these policy interventions enhancing or reducing resilience to climate stress periods?

In the Eastern Cape, there is growing evidence of how changes in rainfall patterns, including droughts, have impacted upon livelihoods, and increased vulnerability of poor communities. Extreme events, such as droughts, have significantly affected production and income activities. An assessment of the impact of climate variability on rural livelihoods (where livelihoods comprise the various activities, assets and capabilities of people's daily lives) has given an insight into the multitude of ways in which human societies, that are poverty stricken or poverty prone, are being affected by climate variability. There is growing pressure on natural resources, especially water and land, due to changing rainfall patterns and temperature. Impacts of drought on water resources pose the most important challenge for these poor communities.

In the 2004/05 period, this study investigated how vulnerability was configured during this period and what decisions people made regarding adaptation strategies in response to a multitude of climate stresses which interact in complex and dynamic ways. The findings indicate the following:

- Water scarcity and/or poor water quality and limited economic and employment opportunities are two major impacts that constrain livelihood development at community level that also undermine adaptive capacity.
- Coupled to this are other resultant spin-off impacts that affect these communities, including poor health and food insecurity. These impacts are further compounded by other impacts that result from other natural hazards, e.g. fires, floods and tornadoes. Several of these impacts have worsened over time because of improper government interventions that are usually inconsistent, unsuitable and unsustainable.
- Human capital, such as people's skills and knowledge, are being challenged as people need to learn new ways of living in order to adapt. Shortage of food, for example, has led to families reducing their food intake per day.
- Higher food prices or lower productivity of land, further exacerbated by water scarcity and poor water quality, have spin offs such as poor health, malnutrition and inability to buy food due to inaffordability.
- As resource availability becomes increasingly limited, so does the ability to secure income alongside the ability to increase and build on assets that can be drawn upon over time or in times of disaster.
- The impact of climate variability on assets links directly and negatively so, to the livelihood activities and resilience of these communities.

Reducing risk and vulnerability, as well as implementing adaptation and building the resilience of vulnerable communities are, moreover, difficult to both measure and implement effectively. Despite these difficulties, such measures are a necessity that is needed to prevent and/or reduce the negative outcomes of disasters usually borne by these poor communities. Cooperative governance and poor institutional capacity to timely develop, organise and implement an integrated and coordinated program that includes risk-reduction plans and adaptation is a necessity. By adopting such an approach, it is hoped that disaster-risks that threaten community livelihoods can be minimized, including related costs that are usually associated with reactive disaster response.

7.3 THEME 3: Disaster-risk Reduction, Disaster-response and Governance

Objective 3: Investigating how institutional governance operates in managing climate-related risks by examining the disbursement of funds, as well as expenditure related to disasters and disaster-relief programs.

As indicated in the case study, South Africa has numerous policies and programs that include sustainable development considerations, but many of these seem often seem to be an *ad hoc* set of activities. As indicated in this case study of droughts, the country is still facing serious challenges, especially inadequate coherent governance that might threaten the successful implementation of climate change adaptation, amongst other initiatives.

Another serious challenge is that of integrating development policies with disaster-risk reduction and climate-change adaptation. Such a lack of consistency, transversal planning and coordination (where appropriate and applicable) could in turn undermine and delay the efforts of implementing effective adaptation.

The Eastern Cape case study also revealed a complexity of issues and challenges associated with implementation of policies at local level. These include:

- There seems to be a lack of understanding of the wider context which necessitates the implementation of these policies. Sustainable development and climate change adaptation are major priorities for national government; however this vision does not seem to have widened in scope to also include other governance layers to include local development policies and civic society.

- In terms of cooperative governance, what emerged during the research is the noticeable gap that existed between the level at which policies are drafted and the level at which they were implemented. Most policies in the country are drafted by various stakeholders, including government consultants, academics and NGOs. The interpretation and implementation of policy then usually remains in the hands of the people whose

understanding of the policy is often limited. As indicated by Munasinghe (2002) the implementation of policy, in particular that which relates to environmental discipline, is often a "frustrating exercise" to everyone concerned because of its cross-cutting nature. Efforts to cross the silos and barriers are very difficult.

- Judging from the South African Constitution, local governments, have absolute powers and a grave responsibility in developing economic, industrial and social sector policies of their own. Local municipalities also have major challenges given that they usually have inadequate capacity to implement these development plans.

- As revealed through community interviews, the provincial governments should also have a major service delivery role in education, health, social development, monitoring and evaluation, as well as an overview of their local governments in many areas of policy, including how these local governments should implement their IDPs. This lack of monitoring and evaluation on the part of the province, in turn affects economic growth, service delivery, job creation and poverty eradication in local municipalities – crucial elements in climate change adaptation.

- Local authorities are still not quite geared to deliver on their development mandate, especially the smaller municipalities, for example, in remote areas of the Eastern Cape. This highlights the need for well-established intergovernmental ties, good resources with skills to deliver, and integrated responses to support local adaptation that departs from a common understanding of development needs. Such a major deficiency on the part of the local authorities also requires improved and increased communication between and across the tiers of government and between local government and communities to facilitate the integration of strategies being implemented at different scales.

- There is still a strong need, where suitable, to seriously strengthen intergovernmental ties from national through to local level, particularly when it comes to drafting and implementing policies related to climate change adaptation, disaster-risk reduction and sustainable development. The expenditure and disbursement of funds for disaster-relief, for example, is a clear indication of this lack of coordination. The failure to seriously address these institutional and capacity requirements will undermine local democracy as well as compromise the implementation of service delivery, which is crucial in building resilience and strengthening adaptation for vulnerable communities.

- National departments, including provincial and local departments, usually only respond to climate-related events in a haphazard manner, when provoked by a crisis event e.g. serious flood or drought. There is little evidence of preplanning for preparedness and disaster-risk reduction. The Disaster Management Act of 2002 is a policy document that

outlines the roles and responsibilities of certain government departments during, and more importantly, before such times of disaster. It is geared towards dealing with disasters in a coordinated organised manner, on a daily basis. This policy, it seems, was not used to give guidance during this drought period. An *ad-hoc* set of actions as indicated in Figure 5.3 took place rather than a carefully and sustainable set of actions.

7.4 THEME 4: Institutional Mapping of Drought Response

Objective 4: Based on the outcomes of the above, reconstruct a framework that mimics Figure 1.1, illustrating the structure of existing cooperative governance in drought management between the several spheres of government in South Africa.

Using the Schipper and Pelling (2006) framework, an attempt was made to illustrate governance and coordination in climate change adaptation, disaster-risk reduction and development in South Africa. The aim of this exercise was to map out some of the possible interactions, connections and disconnections between various factors responsible for managing drought-related risks. This framework (Figure 6.2) illustrated, at a glance, that there were serious shortcomings in the procedure that was followed to respond to the drought event. The framework revealed that the way things are done currently by national, provincial and local governments, is currently not very effective and may not be suitable in the near future, for the effective implementation of adaptation. The following lessons can be deduced from the framework:

- The structure of disaster-response is not clear and simple. There is no coordinated response; hence the response to the 2004/05 drought was largely a chaotic exercise.
- There is no evidence of disaster-preparedness on the part of both national and local governments that is linked to sustainable development.
- Duplication of efforts is highly possible in such an uncoordinated structure of activities.
- There seems to be very weak ties between the three spheres of government, and across national government departments.
- This in-turn affects and or would result in financial mismanagement when it comes to disaster relief funding.
- Similarly this shows the lack of integration between climate change adaptation, disaster-risk reduction and development in South Africa.

- South Africa needs a structure of governance that recognizes and supports adaptation as part of a wider and long-term sustainable response to drought and other climate related disasters.
- Finally, there is a need for an inventory of expenditure, monitoring and evaluation related to drought from all these three tiers of government, so as to provide a history of expenditure and to avoid duplication of work.

7.5 Monitoring and Evaluation: A Very Critical but Noticeable Missing Link!

It is very difficult to actually obtain data on the costs related to disaster impacts and relief. The data that exist have gaps which usually cannot be accounted for. For, example, under IDPs there are suggested frameworks and sectoral plans that needed to be carried out to effect the implementation of the IDP. During the field research, however, some of the suggested sectoral plans were not available when requested from municipalities. For intergovernmental development planning to become a reality, role players across government need to make suitable information available at the appropriate time in a way that is consistent and useful across the three spheres of government. Access to information needs to take place in the process of planning, preparation and revision, instead of when the plans have been completed. Accessing the right information at the most appropriate time relates very much to the annual process of prioritization.

Relief funding is also a problem. Once relief money leaves the national office, it goes to local government. The national departments, however, usually cannot provide evidence that the funds were channelled where they were meant to go and were used for their intended purpose in the local municipalities. The way the disaster-relief funds were disbursed seems to suggest that drought impacts are often treated as uniform, though isolated, despite the fact that different sectors

were affected very differently by the drought disaster. Reactive cost and expenditure on such response measures can be avoided if better understood and co-ordinated.

There also does not seem to be a standardised system of assessing disaster losses (neither for drought impacting and costs and those related to disaster relief). There is, for example, no comprehensive database that shows expenditure on a particular disaster for a particular year or number of years. Such a database could be housed at the National Treasury. Rather than having a coordinated response, each department appears to have its own method of responding to the same disaster. Such a lack of data, as argued by Gupta (2009) and Parry (2009), is quite common in the developing world. This lack of data also makes the evaluation and costing of impacts and relief very difficult. As a result of this wide-ranging and dispersed set of data one cannot be sure that all concerns and data have been covered and this situation makes it even more difficult to generate a comprehensive analysis. For disasters that are a regular phenomenon in South Africa, such as drought, there needs to be a better data management system so that effective risk-reduction measures can be carefully designed and implemented. An effective structure for cooperative governance therefore becomes essential in implementing climate and development-related policies that can be more conducive to adaptation.

7.6 Final Reflections and Recommendations

A key aim of climate change adaptation, disaster-risk reduction sustainable development and proper governance is to ensure that local livelihood risks and vulnerabilities to climate related hazards such as drought is reduced. As is shown in this study, a major shortcoming in the current climate change adaptation, disaster-risk reduction sustainable development and proper governance

efforts in South Africa is the disjuncture between what appears to be noble policy aims and actual implementation at the local level. As shown in Chapter 5, money, though important, is not all that communities require. They also require reliable and sustainable sources of water and proper infrastructure, accessible and effective healthcare and sustainable food provisions (see Chapter 4). This thesis has clearly shown that even though South Africa has good policies that profile these concerns, much is still required to ensure that the most vulnerable are made more resilient during times of climate stress.

By integrating provincial and national priorities such as climate change, the municipalities beginning to strengthen, build and increase the resilience of vulnerable groups to the threats of climate change. Furthermore, such resilient structures could be seen as trade-offs of implementing adaptive strategies in a sustainable manner in the local government. This would also lead to a significant reduction in the amount of money used for disaster-relief by municipalities during times of drought or when a similar disaster strikes. The government needs to seriously consider the major challenge being raised in this study, which is - how can South Africa reverse the trend of the persistent, cyclical need for relief assistance, and rather focus on the development of assets and capacities through which recovery and longer-term programs and risk-reduction efforts and investments can address the underlying causes of poverty and vulnerability? Such an approach would then help in minimising the impacts of climate change and variability by building resilience across and between government agencies and with wider civic society.

As indicated in this study, South Africa's data on disasters, in particular droughts, and disaster recovery and costs are extremely poor. Furthermore, accountability and monitoring and evaluation

of response, especially in local government, is similarly lacking. South Africa, as shown in Chapter 4, has several good policies, at both national and local levels, but the results reveal that the effectiveness of these policies is weakened by incoherence, misalignment and disorganization within some tiers of government, in particular the local level (see also Gupta, 2009).

The implementation of, or lack thereof, of the Disaster Management Act of 2002 is one such example. As indicated in this case study, climate-related disasters bear substantial costs to the poor of South Africa in terms of livelihoods. Such impacts can also bear even greater fiscal costs for the government, particularly in terms of disaster-relief. Indications of some costing, as presented here, is an initial example of the level of costs, which may worsen with future climate change. These costs are not and could never be used, however, as an indication of, or even estimates of adaptation costs. More importantly, as Parry *et al*. (2009) show, the issues of calculating adaptation costs is still very difficult given that one cannot precisely project how climate is likely to change in the future.

Costing for adaptation is not only linked to financial efforts. A critical dimension of climate change adaptation is that linked to governance. Lemos and Tompkins (2008), for example, show from case studies of Brazil and Cayman Islands, that the history of government and structural transformation is not easy to implement either politically or economically. Effective disaster-risk reduction usually requires flexibility, long-term commitment, learning-based responsive governance and politically active learners so that long-term repositioning and reprioritization of policies and implementation, notably that which is pro-poor, for adaptation can occur. In South Africa, the reality is that without effective understanding of the root causes of vulnerability and

risk to disasters (i.e. drought risk-reduction) and the effective governance required, reactive, piece-meal, disaster responses will ensure that we remain on the 'tread-mill' of ineffective responses and crisis management. Such crisis-driven, temporary measures are not suitable for current drought 'coping' nor are they suitable for climate change adaptation.

It is suggested therefore that before the government intervenes it may be worthwhile to find out from communities what kind of assistance they require. Community forums, for example can be used to maintain regular interactions between these communities and government to get a better insight into the problems the communities are facing (refer to Chapter 5). Such forums, as was discovered with the Farmers Forum from Amathole DM, normally have a deeper understanding of community problems and can also provide a history of disaster occurrences and as such, coping and or adaptive strategies. In that way communities could be involved and be part of the solution and they can inform the government of what they want through these forums. In this study, it has been revealed that what weakens government interventions is the 'top-down' poorly articulated approach that is often used to respond to disasters. Suggestions of what could be good interventions between government and communities, for example, have been outlined in Chapter 6 and include:

- Provincial and national governments should make sure that local municipalities ensure that service delivery to poor communities is a priority;
- In some areas, where there is water supply, proper maintenance of this water infrastructure is a necessity. Some taps, for example, had not been working for over three years in some areas (e.g. in Menteku, Port St Johns);
- Trucked water supply could have been used as a temporary measure. In both district municipalities, there was no assistance with water supply during the 2004/05 drought period;
- Monthly supply of food parcels during the drought period is required as well as sustainable food security efforts during non-drought periods;

- Education or capacity building on what impacts to expect from drought and how to deal with such impacts should begin to be captured and shared;
- Assistance with community projects related to agriculture and farming, including equipment such as tractors;
- Training on how to take care of their animals during drought (specifically on immunisation against diseases);
- Assistance with the supply of animal fodder during hard times.

Finally, community forums can be used by government as part of governance and as a way of keeping regular interactions with people at community level, giving the government an insight to what people need. Communities do not want money as an intervention for drought-relief from the government, but rather require more sustainable activities that are closely tied to development. Such forums, as was discovered with the Farmer's Forum from Amathole DM, normally have a deeper understanding of community problems and can also provide a history of disaster occurrences and as such, coping and or adaptive strategies.

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REFERENCES: Personal Communication

In keeping with ethics procedures, personal communication referencing and identities have been removed entirely from the thesis. Below please find respondents from different institutions who agreed to being interviewed and who agreed that their names can be listed in the thesis. My gratitude goes to these individuals for their assistance, in no particular order:

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- Mr M. Dingiswayo
- Mr M. Motsepe
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- Mr P. Lukey
- Mr S. Ntobo
- Mr Z. Madyibi
- Mr Z. Maleki
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- Ms N. Mati
- Ms S. Moroka
- Ms S. Nombexeza
- Ms T. Dlamini
- Ms T. Gill
- Prof R. Banard

APPENDIX 1:

DROUGHTS IN SOUTH AFRICA PER PROVINCE

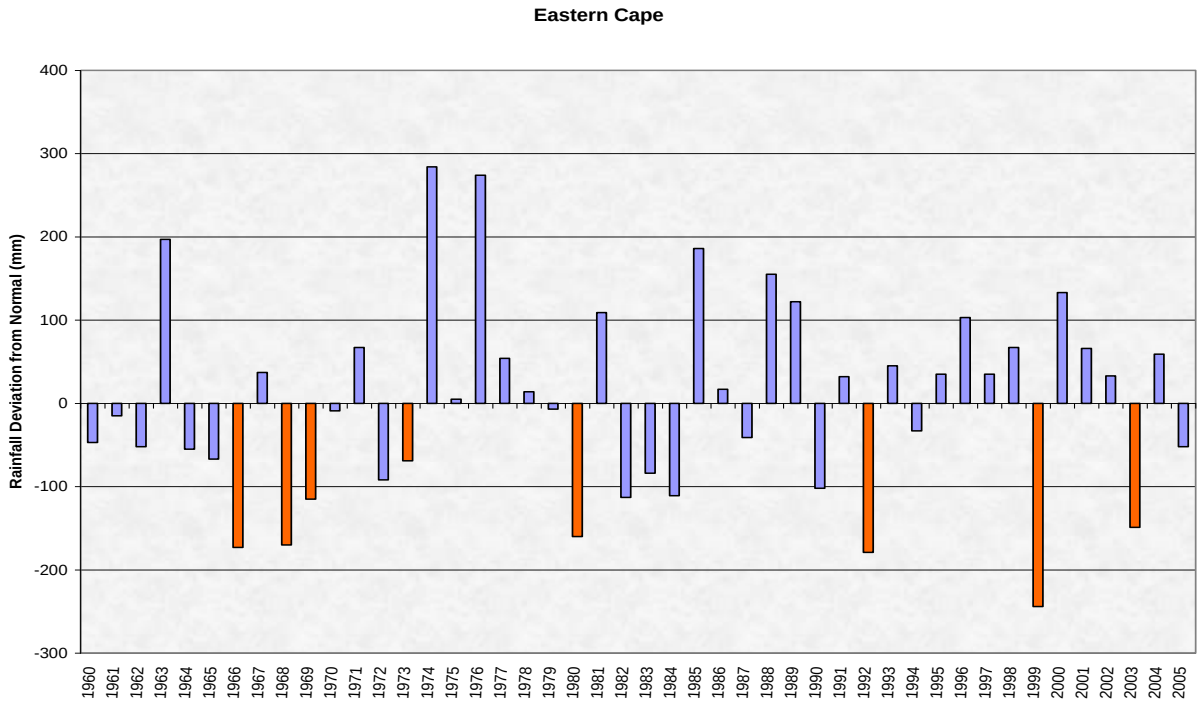
PROVINCIAL RAINFALL BY MONTH, 1960 - 2005

PROVINCE	80% of Normal Rainfall Value (mm)	Deviation Value from Normal for Drought
Eastern Cape	504	-126
Free State	459	-115
Gauteng	560	-140
KwaZulu Natal	738	-184
Limpopo	493	-123
Mpumalanga	649	-162
Northern Cape	208	-52
NorthWest	430	-108
Western Cape	437	-109

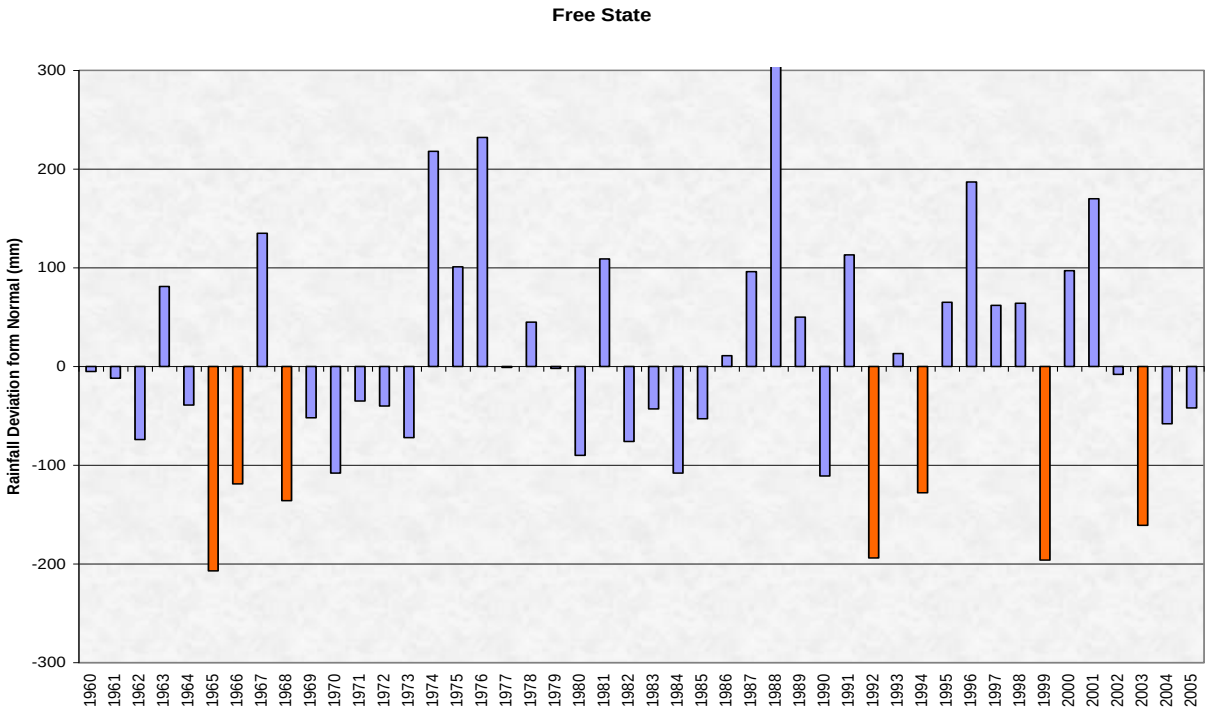
Key:

: Departures from normal rainfall, either above or below normal

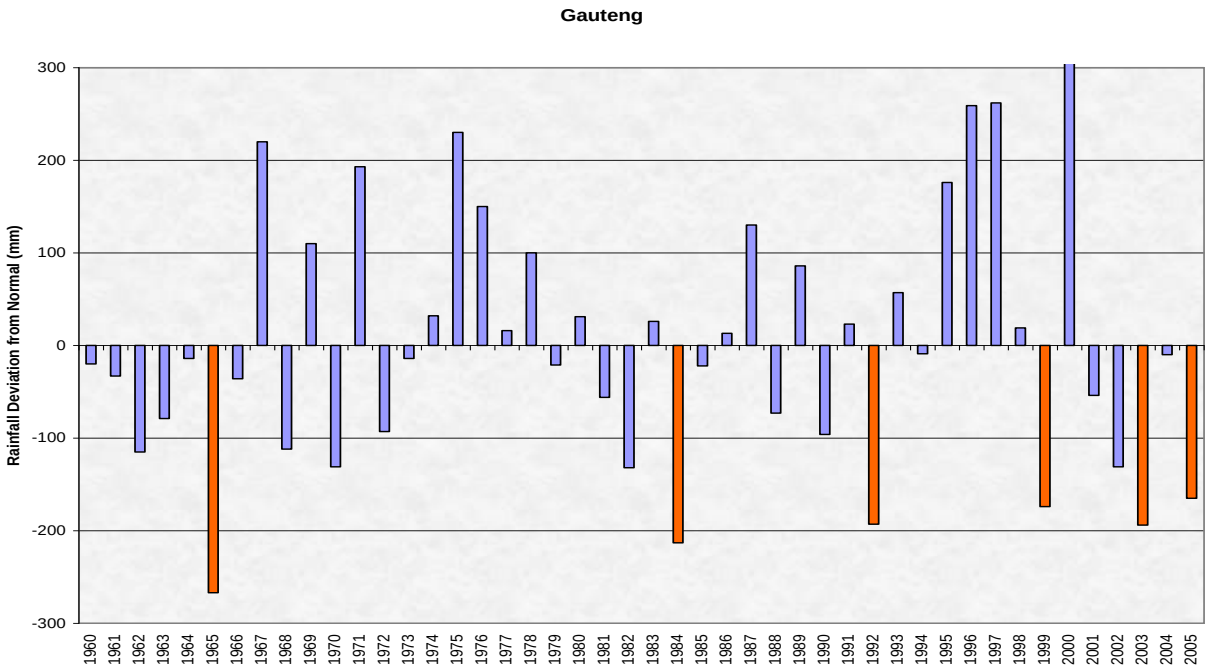
: Years of extreme drought



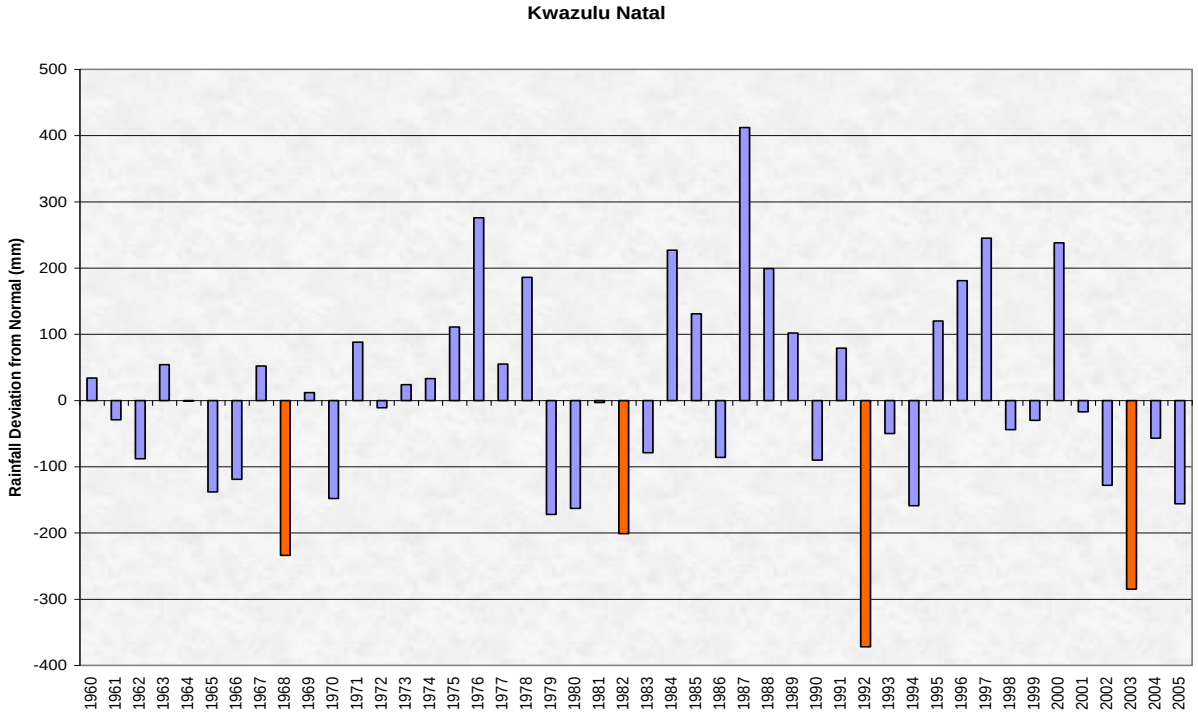
Years of drought occurrences



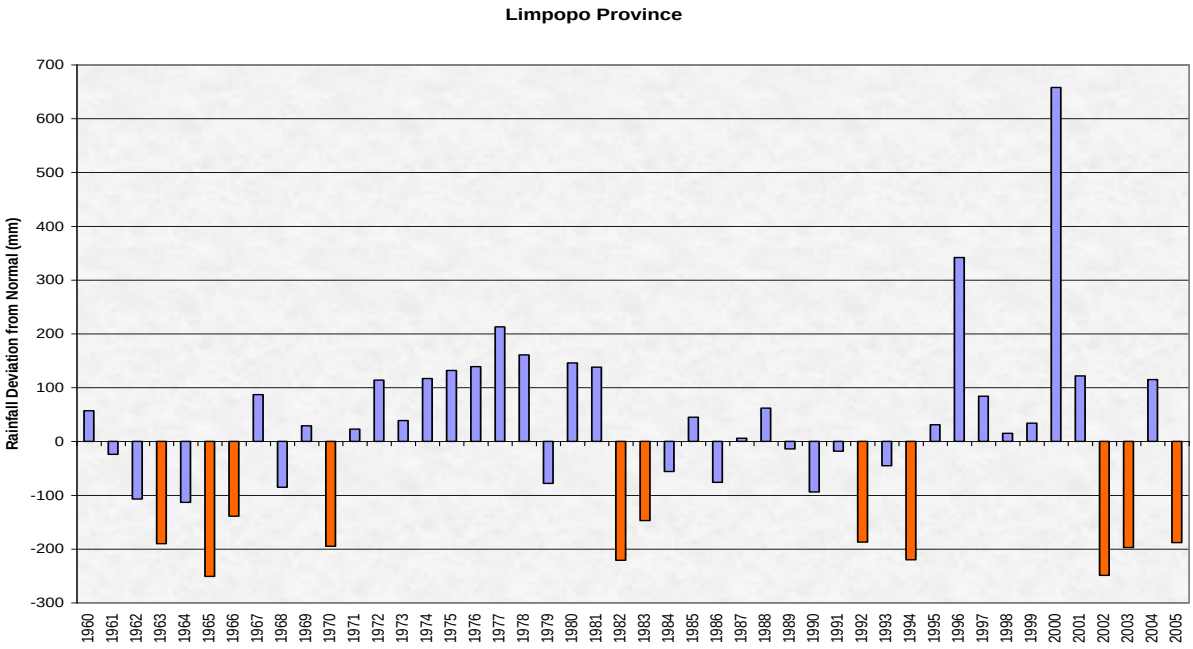
Years of drought occurrences



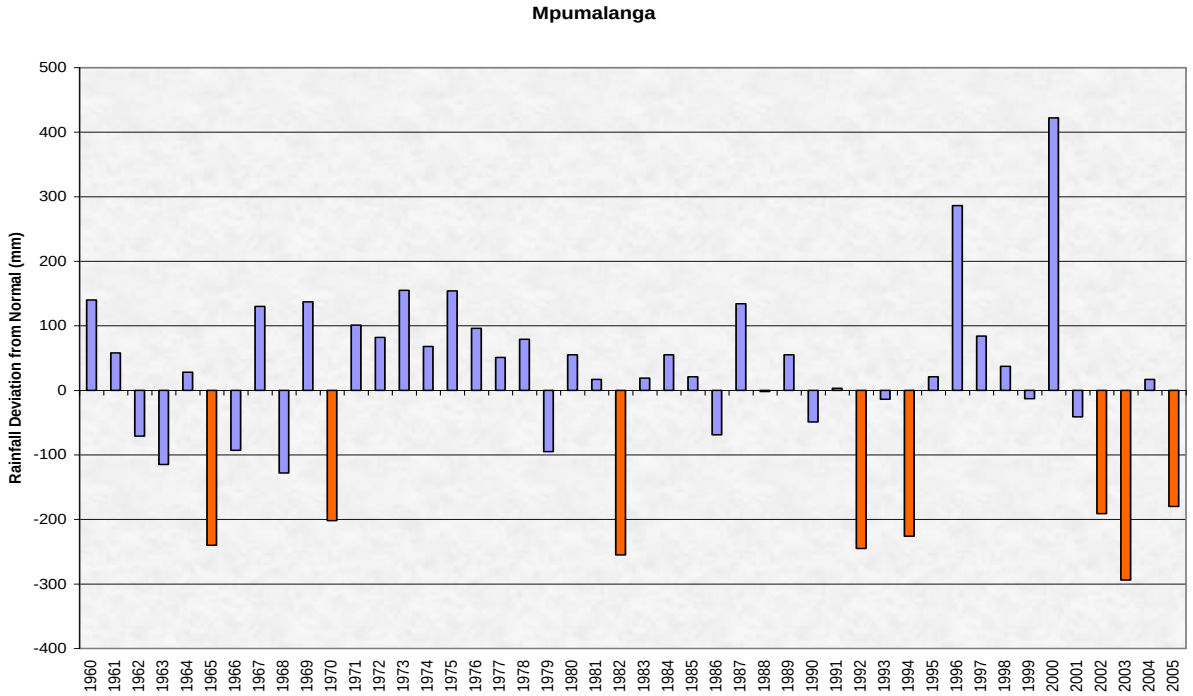
Years of drought occurrences



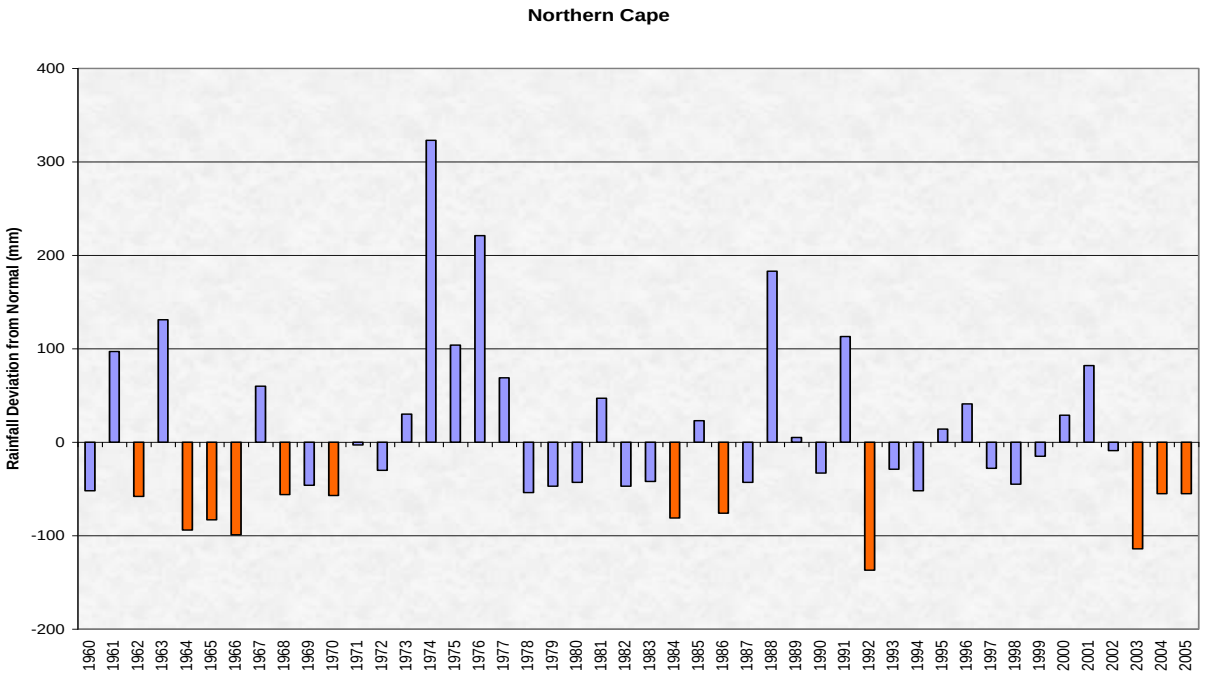
Years of drought occurrences



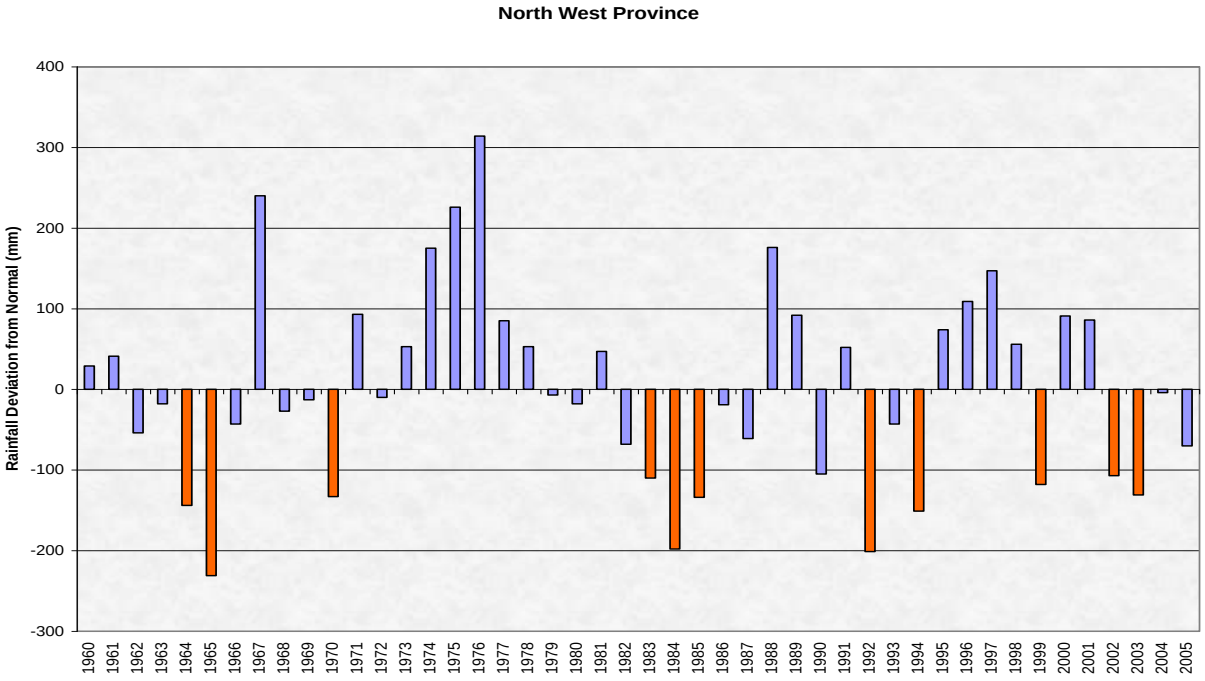
Years of drought occurrences



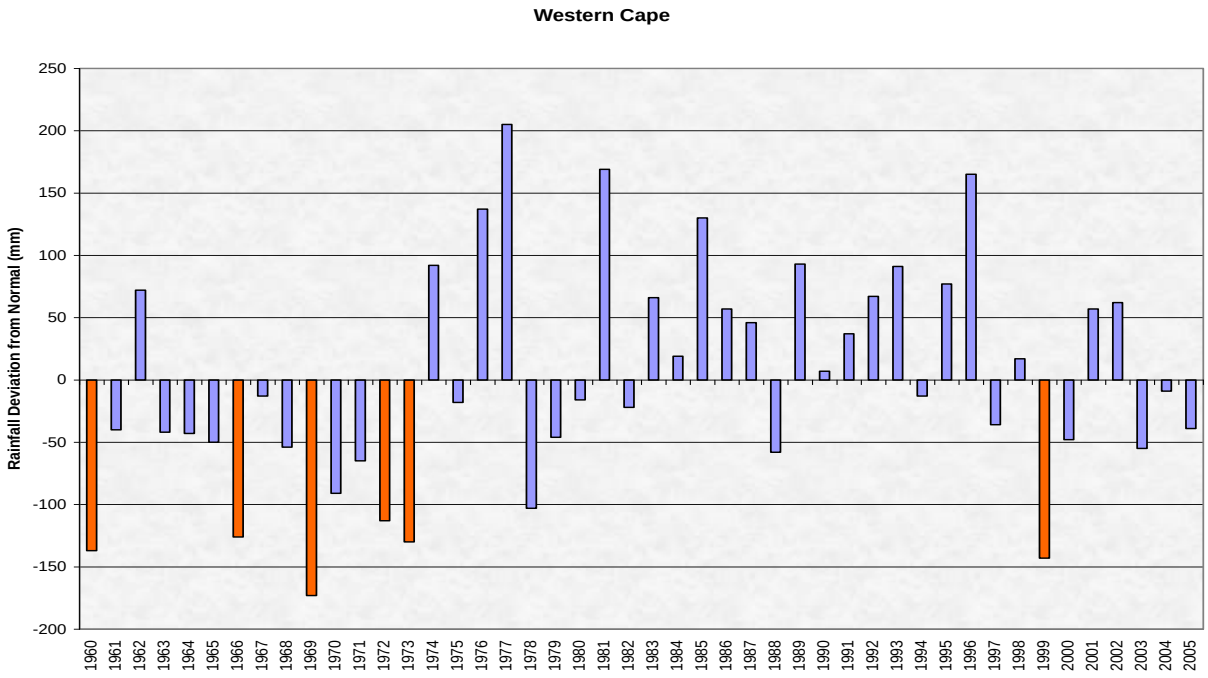
Years of drought occurrences



Years of drought occurrences



Years of drought occurrences



Years of drought occurrences

APPENDIX 2:

QUESTIONNAIRE

QUESTIONNAIRE THEMES

Theme 1: GENERAL INFORMATION

Details of Contact Person	
Name and Age	
Village	
Household relation	
Contact Number (Optional)	

1. Are you responding as an individual or as an organization?

Individual	
Organization	

2. Which of the sectors below, is your institution related?

Water	
Agriculture	
Health	
Environment	
Disaster Management	
Other	

3. What is the role of your organization / institution in climate change related matters? How is your institution / organization affected?

……
……
……

5. Does your organization possess the capacity and resources to assist in managing climate change related disasters (e.g. droughts, floods etc) and if so HOW?

……
……
……

6. What human resource skills does your organization possess to address climate change initiatives?

……
……
……
……

Theme 2: HAZARD OCCURANCES AND IMPACTS (may not be applicable to all)

7. How many droughts/floods/snows has the your area experienced in the past 15 years?.....……

8. What were the noticeable impacts of these droughts/floods/snows?
……
……
……

9. How severe have these droughts/floods/snows (comparatively in terms of their impacts)
……
……
……

10. How were the people affected?.....……
……
……

11. How have the people coped with these droughts/floods/snows in the past?
.....
.....
.....

12. Are there any preparations that your department / organisation has in anticipation of droughts/floods/snows? Please explain
……..……..……
……
……

13. What contributes to the drought/flood/snow being declared as national disasters in the Eastern Cape (e.g. 2003)
…… ……..
……
……

14. Do you think natural disasters can be prevented?
If so, how?
…….....……
…
……If no why?……..……..
……

15. What sort of disaster-relief interventions has the area been getting from both provincial and national government?
……
……
……

16. Have there been problems in getting disaster-relief interventions in this area?
……
……
……

Theme 3: PAST RESPONSE MECHANISMS

17. How has your household/sector/ department/ organization been affected by climate related events, be it a flood or drought or snow?
……
……
……

18. How has your household/department/organization responded to or coped with such in the past?
.....
.....
.....

19. Were there any specific policies in place meant to deal with or respond to drought/floods/snows in your sector?
.....
.....
……
……

20. Do you think the policy / response measure was/ is a sustainable one for the future? and HOW?
.....
.....
……
……

Theme 3: GOVERNMENT INITIATIVES

21. What attempts have been done in the past by the government to prevent drought disasters in the area? e.g. construction of boreholes and dams?
……..……..
……

22. Have these attempts been successful? If yes, how?
……**.....**
……
If no, why?……
……

23. What more proactive measures can the government do to deal with such natural disasters? e.g. early warning systems
……
……

24. Based on your experience in the climate change field, assess the adequacy of the current institutional arrangements for dealing with natural disasters, droughts in particular?

……
……

25. Which departments /institutions should be responsible for the drought management portfolio and why? Please rate these according to importance from 1 to 5 (5 being the most important), e.g. Agriculture, Water Affairs, National Treasury, Social Development, Environmental Affairs, and any other.

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Notes

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