MAINSTREAMING CLIMATE CHANGE ADAPTATION INTO MUNICIPAL PLANNING: LESSONS FROM TWO SOUTH AFRICAN CASES

by

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DECLARATION OF ORIGINALITY

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ABSTRACT

The message that climate change response should be central to municipal planning is clearly communicated in policy, science, and practice; and given that municipal planning is the core function of local government, the task of climate change response mainstreaming lies with them. There is however limited guidance offered to municipalities on how to go about mainstreaming climate response into planning. This study explores how climate change response, with a specific focus on adaptation, can be mainstreamed into South African local government planning instruments and processes. The study is largely framed in critical pragmatism in that it looks into real-world situations and appreciates context-specific complexity to make recommendations relevant to practice. Using a comparative case study design, two cases where mainstreaming has been undertaken were explored. Cape Town Metropolitan Municipality in the Western Cape Province and Thulamela Local Municipality in the Limpopo Province were selected as atypical cases with core similarities and contextual differences, which are able to offer information on the phenomenon of mainstreaming. A qualitative content analysis was undertaken of their latest Integrated Development Plans and Spatial Development Frameworks for both the cases, and the Built Environment Performance Plan in the case of Cape Town. Individual interviews were done in one case and a group interview in the other. Participants included spatial planners, environmental practitioners, and an infrastructure planner, all of whom have been involved in planning, climate change response and resilience. Similar themes with different findings emerged from the two cases, indicating that planning processes and experiences are very context-specific. The themes or factors that emerged can contribute to success in one case and cause significant challenges in another. These factors are a) champions, leadership and momentum, b) networks, mobilisation and organisation, c) information gathering, use and sharing, d) capacity, resources and skills, e) institutional support and coordination, and f) intergovernmental relations and mandate. The study contributes to the fields of local government, municipal planning, climate change adaptation mainstreaming, and the intersection between these fields. Insights are provided into the factors and conditions that can either support or hinder effective mainstreaming of climate change adaptation into local municipal planning instruments and processes, and recommendations are provided to support more effective mainstreaming in local government.

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LIST OF ABBREVIATIONS

AAPS	Association of African Planning Schools
BEPP	Built Environment Performance Plan
C40	C40 Cities Climate Leadership Group
CDS	City Development Strategy
CEF	Capital Expenditure Framework
CSP	Cities Support Programme
DEFF	Department of Environment, Forestry and Fisheries
IDP	Integrated Development Plan
IMEP	Integrated Metropolitan Environmental Plan
IPCC	Intergovernmental Panel on Climate Change
LGCCSP	Local Government Climate Change Support Programme
LRT	Let's Respond Toolkit
M&E	Monitoring and evaluation
NCCAS	National Climate Change Adaptation Strategy
PMU	Project Management Unit
SALGA	South African Local Government Association
SDBIP	Service Delivery and Budget Implementation Plan
SDF	Spatial Development Plan
SPLUMA	Spatial Planning and Land Use Management Act No. 16 of 2013
TMS	Transversal Management System
TOD	Transit Oriented Development
UNFCCC	United Nations Framework Convention on Climate Change

CHAPTER 1:
INTRODUCTION

1.1. Background and rationale

South African cities and towns are inherently vulnerable to climate risks due to their socio-economic and physical make-up and configuration, shaped by Apartheid planning which created a country with huge disparities in quality of life, and access to economic opportunity (Oranje, 2010; Van Niekerk and Le Roux, 2017). These socio-economic and spatial disparities are exacerbated by continued unsustainable development, urbanisation, and slowed economic growth to which climate change is an additional stressor (Roberts and O'Donoghue, 2013; Van Niekerk and Le Roux, 2017). Through the introduction of the Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA), South Africa's planning system evolved from a largely fragmented legal framework to a more uniform legal regime (Joscelyne, 2015; Nel, 2016; Barnes and Nel, 2017). Gazetted on 5 August 2013 but coming into force only in 2015, SPLUMA guides and enables the formulation of policies and plans for land use management, land development and spatial planning (Republic of South Africa, 2013). The enactment of SPLUMA provides "a cohesive spatial planning and land use management system for the entire country" (Nel, 2016, p. 80), while also reinforcing planning as the primary mandate of municipalities, and emphasising their role in planning. Sustainability is one of the cornerstones of SPLUMA and as part of it, five key principles are to be applied to all aspects of spatial planning, land development, and land use management. The five principles are spatial justice, spatial sustainability, efficiency, spatial resilience and good administration. The principle of spatial resilience is described in section 7(d) of the Act as "flexibility in spatial plans, policies and land use management systems are accommodated to ensure sustainable livelihoods in communities most likely to suffer the impacts of economic and environmental shocks". Barnes and Nel (2017, p. 220) argue that resilience is both a concept as well as a way of thinking, and offers a way to analyse how cities can adapt to change and disruption. Climate resilience refers to the ability of a system, or a city, to adapt and respond to changes and impacts related to climate and climate change. The inclusion of spatial resilience as one of the SPLUMA principles to guide planning across all spheres of government highlights the important role of planning in climate responsiveness and resilience, particularly at a local level.

It is anticipated that South Africa will generally experience more extreme weather events such as heatwaves, urban flooding, coastal flooding, and drought (Tadross et al., 2017). Cities and

towns are also experiencing socio-economic changes that converge with changes in the climate to impact on space and increase the risk and impact of hydro-meteorological disasters (Van Niekerk, Le Roux, et al., 2019). Some of the key drivers of socio-economic change in South African cities and towns include urbanisation, growing inequality, and growing informality (Van Niekerk and Le Roux, 2017). The impact of these dynamics and climate-related events on cities and people are significant and will result in an increased risk of disasters if there is no reduction in vulnerability (Davis-Reddy et al., 2017). Local government, in particular, is increasingly faced with the responsibility to address the effects of climate change as their vulnerable communities and infrastructure are affected by climate change-related events. It is widely recognised that climate change-related impacts on vulnerable households, communities, town economies and critical infrastructure and services are often most profound at the settlement level, and thus where adaptation is needed most (Sanchez-Rodriguez, 2009; Carmin, Nadkarni, et al., 2012; Dannevig et al., 2012; Madzivhandila, 2014; Pasquini et al., 2015; Chu et al., 2016).

Local and district government, as part of their developmental mandate, are responsible for service delivery and infrastructure investment, cross-sectoral integrated and spatial development, alignment of government spending, disaster risk management, and amongst a range of other sector-specific focus areas, also for climate change mitigation and adaptation (Pieterse et al., 2016). Climate change is a cross-cutting, development challenge and should be addressed through developmental planning, and local government functions, such as infrastructure and services provision, infrastructure maintenance and integrated development planning, which can facilitate adaptation within cities and towns. Pasquini et al. (2015) maintain that in the South African local government context, deficiencies in leadership, knowledge and information regarding climate adaptation issues, lack of resources, strong institutional silos and political variability, make climate change adaptation challenging. Municipalities in South Africa often operate under severe financial constraints, with numerous competing priorities and under significant pressure to deliver services to communities (Spires, 2015). These constraints and pressures make it difficult for local government to practice climate change adaptation, especially considering that the mandate for municipalities to engage in climate change adaptation is not clearly set out in any of the policy or legislation that guides the functioning of local government (Spires, 2015). Given the role of local government, and its developmental mandate and challenges, sustained climate action is unlikely to be supported if it does not also address developmental needs (Hetz, 2016).

The National Development Plan (NDP) provides a long-term vision and plan for the country and aims to eliminate poverty and reduce inequality by 2030 (National Planning Commission, 2012). The NDP recognises climate change as a developmental issue. Together with the NDP, there are a number of other policies that guide South Africa's transition to a low carbon and climate-resilient society. One of the first was the National Climate Change Response White Paper which identified local government as a critical role-player that can build climate resilience through "planning human settlements and urban development; the provision of municipal infrastructure and services; water and energy demand management; and local disaster response, amongst others" (Republic of South Africa, 2011, p. 38). The Disaster Management Act No 57 of 2002 also assigns responsibility to local government in terms of disaster risk reduction and climate change adaptation (Republic of South Africa, 2002). More recently, the Climate Change Bill of 2018 was published and aims to facilitate a more coordinated and integrated response to climate change and its impacts by all spheres of government. The Bill requires the development of climate change response assessments and implementation plans on either district or municipal level, but has not been enacted yet (Department of Environmental Affairs, 2018a). The Bill itself does not provide more detail on the responsibilities of the different spheres of government, but does require that such a framework be developed as per Section 6 of the Bill. A Draft National Climate Change Adaptation Strategy (NCCAS) was published for comment in May 2019 to serve as the country's National Adaptation Plan in fulfilment of international obligations under the United Nations Framework Convention on Climate Change (UNFCCC) (Department of Environmental Affairs, 2018b). The NCCAS requires all municipalities to draft climate change strategies and implementation plans (in Section 7), and to establish a Municipal Committee on Climate Change (in Section 10) to coordinate climate response actions. In setting these requirements, the NCCAS recognises the role of local government in responding and adapting to climate change, as well as a general need for guidance and capacity building within local government to be able to fulfil this role. Some support to district and local municipalities are already provided by the Department of Environment, Forestry and Fisheries[1] (DEFF) and the South African Local Government Association (SALGA) through the Local Government Climate Change Support Programme (LGCCSP). Through the LGCCSP, DEFF together with SALGA and the Department of Cooperative Governance and Traditional Affairs developed Let's respond: a guide to integrating climate change risks and opportunities into municipal planning, also known as the Let's Respond Toolkit (LRT) (Department of Environmental Affairs, n.d.).

[1] Previously the Department of Environmental Affairs (DEA).

The purpose of the LRT is to guide municipal practitioners through the necessary steps to integrate climate change responsiveness into the planning process, using the IDP.

A common thread running through all the policies and activities discussed above is that for local government to build more resilient communities and spaces, they should integrate climate change into their planning instruments. One of the nine strategic interventions of the NCCAS is to facilitate the mainstreaming of adaptation responses into sectoral planning and implementation, and particularly into municipal development and infrastructure planning (Department of Environmental Affairs, 2018b). It is clear that local government is a key player in the adaptation process, but what is less clear is the mandated role of local government in this space. Even though the White Paper and the draft policies that followed it, acknowledges this, mandates have not been clearly defined, leaving local government to deal with the compounded effects of climate change and developmental challenges without sufficient mandate, resources, support or guidance.

As a signatory of the UNFCCC, South Africa is legally required to report on national circumstances; a national Greenhouse Gas (GHG) Inventory; projected climatic changes over South Africa, vulnerability assessments and national adaptation strategies; measures to mitigate climate change; and other information relevant to the Convention (Department of Environmental Affairs, 2018c). South Africa is also required to integrate climate considerations into relevant social, economic and environmental policies, as per Article 4, paragraph 1 (f), of the Convention (United Nations, 1992). Besides the well-known benefits and opportunities of mainstreaming climate change adaptation such as increased policy coherence, limited policy duplications and contradictions, avoiding maladaptation, and increased adaptive capacity (Rauken et al., 2015), South Africa also has a legally binding obligation to do so.

Mainstreaming adaptation into planning instruments allows early action which is more cost-effective than after-the-fact response (Wilson, 2006). Revi et al. (2014, p. 14) argue that local governments are at the centre of successful adaptation because much of adaptation depends on local government integrating it into local policies, plans and processes. Further in this chapter as well as in Chapter 2, I continue this argument that for adaptation to be implemented and to inform how our cities and towns are shaped in future, it needs to form part of the instruments and processes that guide spatial planning and development on a local level. Climate change response, particularly adaptation, needs to be integrated into local planning instruments, in order to influence all steps of the planning process through to implementation and ultimately leading to change and impact.

1.2. Aim and objectives of the study

The aim of this study is to explore how climate change response, with a specific focus on adaptation, can be mainstreamed into South African local government planning functions by describing two different municipal cases, namely the City of Cape Town Metropolitan Municipality and Thulamela Local Municipality, where climate change responsiveness and mainstreaming into local government planning functions have been undertaken. Given the two cases, the objectives of the study are:

1. To determine the extent to which climate change response is currently mainstreamed in relevant municipal planning instruments, namely Integrated Development Plans (IDP), Spatial Development Frameworks (SDF), and Built Environment Performance Plans (BEPP) in the case of metropolitan municipalities;
2. To explore the factors that hindered and/or enabled the process of mainstreaming climate change response and adaptation into municipal planning; and
3. To identify ways for more proactive and effective mainstreaming of climate change adaptation into municipal planning.

The research may contribute towards a better understanding of the complexities and challenges surrounding adaptation planning practice in local governments in South Africa. More specifically, the research may help to identify ways that can support the mainstreaming of climate change adaptation into local municipal planning.

1.3. Definitions and concepts

Throughout this research, there are certain concepts that are core to the discussion. These include climate change adaptation and mainstreaming, municipal planning, and adaptation planning. For clarity and consistency, the definitions of each of these concepts are discussed below, offering a theoretical framing to the research.

1.3.1. Climate change adaptation and mainstreaming

Climate change refers to a change in the mean and the variability of climate properties, persisting for an extended period of time. These changes may be because of natural processes or because of external forces such as anthropogenic changes in the composition of the atmosphere and in land use (IPCC, 2014, p. 120). Climate change adaptation exists in

the wider context of climate change response together with mitigation and disaster risk reduction and management, as measures of human intervention to mitigate for the factors that contribute to climate change and global warming, and/or limit the adverse impacts of climate change on human and natural systems. Mitigation of climate change is a human intervention to reduce the sources of greenhouse gas emission that contribute to the warming of the global mean surface temperature (IPCC, 2014, p. 125).

Climate change adaptation is defined as “the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects” (IPCC, 2014, p. 115). Disaster risk reduction is defined as “the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events” (UNISDR, 2009, p. 10). Disaster risk reduction includes all forms of activities to avoid (prevention) or to limit (mitigation and preparedness) the adverse effects of hazards. There are similarities in the aims of disaster risk reduction and climate change adaptation as both focus on reducing vulnerability and managing risk, and they are mutually beneficial as many disaster risk reduction measures can directly contribute to better adaptation, and both contribute to building resilience. Vulnerability can be defined as the propensity or predisposition of an individual, community, assets or systems to be adversely affected by the stresses associated with environmental, social, economic and physical change (Adger, 2006; UNISDR, 2009; IPCC, 2014).

Figure 1 below illustrates the relationship between disaster risk management and climate change adaptation (IPCC, 2012). It further illustrates how both can reduce exposure and vulnerability to weather and climate events and thus reduce disaster risk, as well as increase resilience to the risks that cannot be eliminated. Both climate change adaptation and disaster risk reduction relate to development planning, but have continued to evolve largely in isolation from each other despite both the Intergovernmental Panel on Climate Change (IPCC) and United Nations Office for Disaster Risk Reduction (UNDRR, formerly known as UNISDR) recognising the inherent interdependencies of climate change adaptation and disaster risk reduction (Seidler et al., 2018). However, there are some differences between the two concepts in that disaster risk reduction is aimed at protecting livelihoods and assets from the impacts of hazards and it relates to short onset disasters, while climate change adaptation is

focussed on longer-term perspectives and aims to reduce the negative impacts of climate change on communities and the built environment (McBean and Ajibade, 2009).

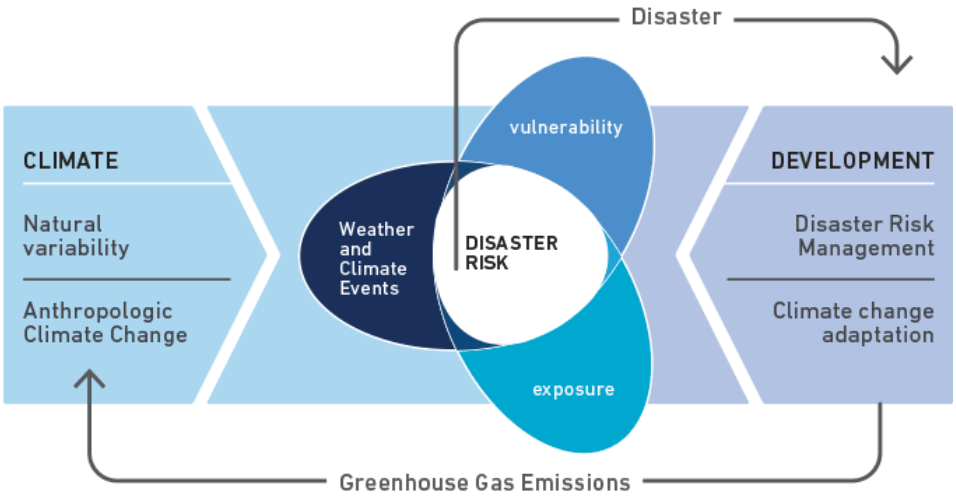

Figure 1: The relationship between disaster risk management and climate change adaptation (IPCC, 2012, p. 4).

Resilience-thinking emphasises dynamism, change, adaptability and flexibility (Taylor, 1998; Pisano, 2012). Resilience is defined as the ability of a system, and its components (i.e. community, economy or infrastructure) to anticipate, resist, absorb, accommodate or recover from the effects of a hazardous event in a timely and efficient manner, while preserving, restoring or improving its essential basic structures and functions (UNISDR, 2009, p. 24; IPCC, 2014, p. 563). Juncos (2017) argues that resilience requires flexibility, preparedness and adaptation to unknown risks, ultimately embracing change, complexity and uncertainty rather than trying to eliminate it. Building resiliency to the impacts of climate change in the systems and components that make up a city, is key to protecting hard-earned development gains and efforts made towards sustainability (Leichenko, 2011). Resilience-building is dependent on internal capacity and capabilities, and externally driven interventions are likely to have limited ability to address local complexities (Curtin and Parker, 2014; Juncos, 2017). Resilience-building is also recognised as a strategic approach to addressing complex and dynamic systems that face high levels of uncertainty, as which are associated with cities and climate change (Tyler and Moench, 2012).

Transformational adaptation has emerged as a concept in response to the perception that incremental adaptation is not enough to be bring about the change needed to secure a sustainable and resilient future, and has been used within the climate change adaptation research community for close to a decade (Kates et al., 2012; Lonsdale et al., 2015). The

IPCC took up the term in their reporting and defines transformational adaptation as involving behavioural and lifestyle changes, systemic change, and new approaches to urban planning, while incremental adaptation is more about responding and preparing for the impacts of climate change (IPCC, 2018). Pelling et.al. (2015, p. 114) describes transformational adaptation as the ability to adjust existing systems to follow alternative development pathways, and argues that transformational adaptation addresses structural causes of vulnerability as opposed to incremental adaptation that addresses proximate causes. The concept of transformational adaptation, and how it is defined, highlights the important link between adaptation and development. Transformative adaptation offers a tool to leverage adaptation in support of sustainable development (Pelling et al., 2015).

The term 'mainstreaming' is widely used by policy-makers, scientists and academics despite the fact that it has not been defined specifically, although the advantages of the action of mainstreaming has been widely proclaimed (e.g. Lebel et al., 2012; Heazle et al., 2013; Uittenbroek et al., 2013; Biesbroek et al., 2014; Rauken et al., 2015; Wamsler, 2015a; Wamsler and Pauleit, 2016; Ogato et al., 2017; Runhaar et al., 2018). The aim of mainstreaming is to make climate change, and adaptation part of other well-established programmes and instruments (Hagen, 2016). Wamsler (2015a, p. 2) states that "mainstreaming is motivated by the need to change the dominant paradigm" and further links mainstreaming to the concept of transformative adaptation. The concept of mainstreaming is further unpacked throughout this study, but for the purposes of framing the discussion, I will consider it as the process of integrating climate change adaptation strategies and measures into existing instruments and processes, particularly those related to development and spatial planning, as opposed to developing dedicated climate change adaptation policies and plans.

1.3.2. Municipal planning

The functional area of "municipal planning" is listed in part of Schedule 4 of the Constitution as a power and function of local government (Republic of South Africa, 1996). There is nothing in the Constitution indicating that the word carries a meaning other than its common meaning. Exploring what municipal planning means in terms of the constitution and in the context of the powers and functions of the three spheres of government, Van Wyk (2012) recognises that municipal planning involves integrated development planning and spatial planning as per the Municipal Systems Act 32 of 2000. With the enactment of SPLUMA in 2013, some additional clarity was provided on what municipal planning entails. As per SPLUMA Section 5(1), municipal planning consists of the compilation, approval and review of integrated development

plans (IDP) as well as the components of an IDP, including a spatial development framework (SDF) and a land use scheme. Further, municipal planning involves the control and regulation of land use within a municipal area. Therefore, for the purpose of this study municipal planning will be defined as spatial planning, land-use management and integrated development planning on the municipal level.

It is also important to note that there are different categories of municipalities, as identified in Section 155 the Constitution and defined further in the Municipal Systems Act. Category A municipalities mean metropolitan municipalities having exclusive municipal executive and legislative authority, Category B means local municipalities with shared municipal executive and legislative authority in its area with a Category C municipality, and a Category C means district municipalities that have municipal executive and legislative authority in an area that includes more than one municipality. Executive and legislative authority within local municipalities are vested in their Municipal Councils. All the matters that local municipalities have legislative and executive authority over are captured in Part B of Schedule 4 and Part B of Schedule 5 of the Constitution and include matters such as building regulations, municipal planning, cleansing, municipal parks, and municipal roads. All municipal categories practice municipal planning and are governed by the Constitution, the Municipal Systems Act and SPLUMA.

1.3.3. Adaptation planning

To define adaptation planning, it is necessary to first define spatial planning and explore the relationship between spatial planning and climate change adaptation. Spatial planning can be defined as a “decision-making process aimed at realizing economic, social, cultural and environmental goals through the development of spatial visions, strategies and plans and the application of a set of policy principles, tools, institutional and participatory mechanisms and regulatory procedures” (UN-Habitat, 2015, p. 1). Spatial planning also covers a range of scales from neighbourhood to supra-national level, and “aims at facilitating and articulating political decisions and actions that will transform the physical and social space and affect the distribution and flows of people, goods and activities” (UN-Habitat, 2015, p. 1). Albrechts (2004) additionally recognises strategic spatial planning as a “public-sector-led, socio-spatial process”. Ultimately, spatial planning is about guiding decision-making and development to shape space that reflects a strategic vision.

Spatial planning is a key tool to support adaptation and plays a critical role in anticipating change and promoting robust adaptation within urban spaces (Van Niekerk, 2013; Goosen et al., 2014; Wamsler et al., 2014). Biesbroek et al. (2009) recognises spatial planning as a holistic approach to shaping development whereby it is able to coordinate and reconcile different, or sometimes competing, objectives. The three main interactions between spatial planning and climate change adaptation are that both anticipate change, both support long-term sustainable development, and both intervene in space. These concepts can be seen in terms of process, where both climate change adaptation and spatial planning consider future change, respond by taking a long-term sustainable planning approach and then act through place-based interventions, as explained below.

As defined earlier, adaptation is concerned with the anticipated change in climate and related climate events and entails taking measures to mitigate the negative impacts of these changes and events. Spatial planning creates a vision of a future environment, meaning that the planning process is required to be aware of and anticipate change to ensure that visions are placed within a specific context (Albrechts, 2004). Spatial planning is concerned with a longer-term vision of anticipated development in space, e.g. to influence the location and density of development. Because climate change adaptation is forward-looking in nature, by considering projected and anticipated changes in climate, there is a link with the long-term nature of spatial planning. Planning typically draws from past trends to inform long-term public investment decisions, but adaptation planning introduces projected changes as evidence for planning (Carmin, Nadkarni, et al., 2012). Considering and addressing climate change is essential for any city to be on a long-term path toward sustainable development (UN-Habitat, 2014). Sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (IPCC, 2014, p. 564). Sustainable development is closely related to the concept of resource efficiency, through which the aim is to achieve better economic outcomes and wellbeing, while using fewer natural resources and reducing environmental impacts (International Resource Panel, 2018, p. 8). Spatial planning and adaptation both promote a long-term planning approach by encouraging actors to plan and as act for the future.

Climate impacts are most strongly felt on the local level, and are inherently spatial. Therefore, where climate services information such as climate change projections, hazards and vulnerabilities are communicated, geographic visualisations are most useful and relevant to local response and planning (Hunt and Watkiss, 2011; Van Buuren et al., 2013). Climate change adaptation, therefore, has spatial implications in response to the evidence provided

by climate services (Goosen et al., 2014). The spatiality of both climate change adaptation and spatial planning are in support of targeted interventions in space. Because adaptation is geographically specific in its response to climate change (Biesbroek et al., 2009; Goosen et al., 2014), it provides a practical way for spatial planners to include climate change considerations in the planning process. Planners generally have a divergent view of climate change from other practitioners, such as for example engineers, viewing it as one of many "context-dependent environmental and socio-economic challenges" (Biesbroek et al., 2009, p. 231). This intersection of anticipating change (Bulkeley, 2006) and appreciating geographical variability (Halsnaes, 2006), makes spatial planning a fundamental tool for integrating climate change adaptation with development planning to create order, reduce conflicts among activities, use resources efficiently, and seek to benefit all of society (Sanchez-Rodriguez, 2009). Spatial planning thus has a key role to play in reducing vulnerability, and building resilience to the impacts of climate change (Bulkeley, 2006; Van Buuren et al., 2013; Van Niekerk, 2013). For this study, I define adaptation planning as the process of using the basis of spatial planning to shape built-up and natural areas to be resilient to the impacts of climate change and to realise co-benefits for long-term sustainable development to address root causes of vulnerability and exposure to risk. This interpretation of adaptation planning is also similar to definitions of transformational adaptation, as introduced earlier.

1.4. Methodological paradigm

Research paradigms are philosophical frameworks wherein inquiry occurs, influencing what is considered meaningful and what actions that accepted as appropriate, thereby setting down the intent and expectations for the research (Mackenzie and Knipe, 2006; Morgan, 2014). Creswell (2003) uses the term 'knowledge claims' instead of paradigms and defines it as providing certain assumptions about how research will be done and what will be learnt from it. Pragmatism as a research paradigm, places the research question at the centre of the inquiry process which includes data collection, analysis and interpretation (i.e. the methodology), and is largely concerned with the 'what' and the 'how' of the research question as it relates to real-world practice (Creswell, 2003; Mackenzie and Knipe, 2006). Morgan (2014) introduces pragmatism as a coherent philosophy or paradigm that goes beyond the classical associations with practicality and procedure. Pragmatism treats approaches to research and abstract philosophical arguments about the nature of reality or the possibility as truth, as social contexts for inquiry (Morgan, 2014). Pragmatism as a paradigm for social research is often associated with mixed-methods research, but Morgan (2014) argues that pragmatism can serve qualitative, quantitative as well as mixed-methods research. Key to the pragmatist paradigm

is the acknowledgement that inquiry occurs in complex, real-world contexts (Creswell, 2003; Morgan, 2014). It therefore acknowledges that reality has both an objectivist causal nature (as positivism suggests) and a subjectivist nature with various possible social meanings (as social constructionism suggests).

Gidden's structuration theory, and related concepts such as structure and agency are very relevant to practice, and research focussing on practice (Whittington, 2010). Structuration recognises continued interaction and linkages between authority or rules, resources, and ideas or frames of references, as generating and maintaining structures wherein power relations are embedded (Healey, 2003; Whittington, 2010). It is argued that power is closely linked to understanding planning systems, and that an approach that considers structure and agency, is important when studying the implementation of public policy initiatives (Healey and Barrett, 1990; Watson, 2009). Critical pragmatism combines classical pragmatist conceptions of inquiry with critical theory and its recognition of power dynamics. In her thesis on critical pragmatism in planning, Zack (2008) defines critical pragmatism in terms of an analytical framework for examining planning practice. Critical pragmatism as methodological paradigm is reflective of the social, physical and political context, and the relations of power that operate in such contexts (Zack, 2008), and it has a strong concern with process, outcomes and real-world solutions (Forester, 2013). Similarly, adaptation and the process of mainstreaming is seen as part of the dynamics associated with society, and not just a technical process of adjustment by society, i.e. adaptation planning and mainstreaming is seen as a socio-political process (Eriksen et al., 2015). It is therefore appropriate that I frame this study in critical pragmatism, as it aims to look at real-world situations, explore the nuanced conditions, and make relevant recommendations for practice. Through a qualitative approach, context-specific complexity is appreciated and approaches or interventions that are relevant to practice are sought. The qualitative analyses are done through a content analysis of documents and a thematic analysis of stakeholder interviews (Du Toit, 2015).

The methodological paradigm that shapes this study and how it relates to the research objectives are illustrated in Figure 2. As introduced in Section 1.2 of this chapter, the study has three objectives of which the first is to determine the extent to which climate change adaptation is currently mainstreamed in relevant municipal planning instruments. The second objective is to explore the factors that hindered or enabled the process of mainstreaming climate change adaptation into municipal planning. The third and final objective is to identify ways for more proactive and effective mainstreaming of climate change adaptation into municipal planning. Within the context of local government, a comparative case study research

design is employed to explore these objectives through inquiry into planning instruments and planning processes, and to make recommendation for local government. The research design is, in its entirety, framed in critical pragmatism.

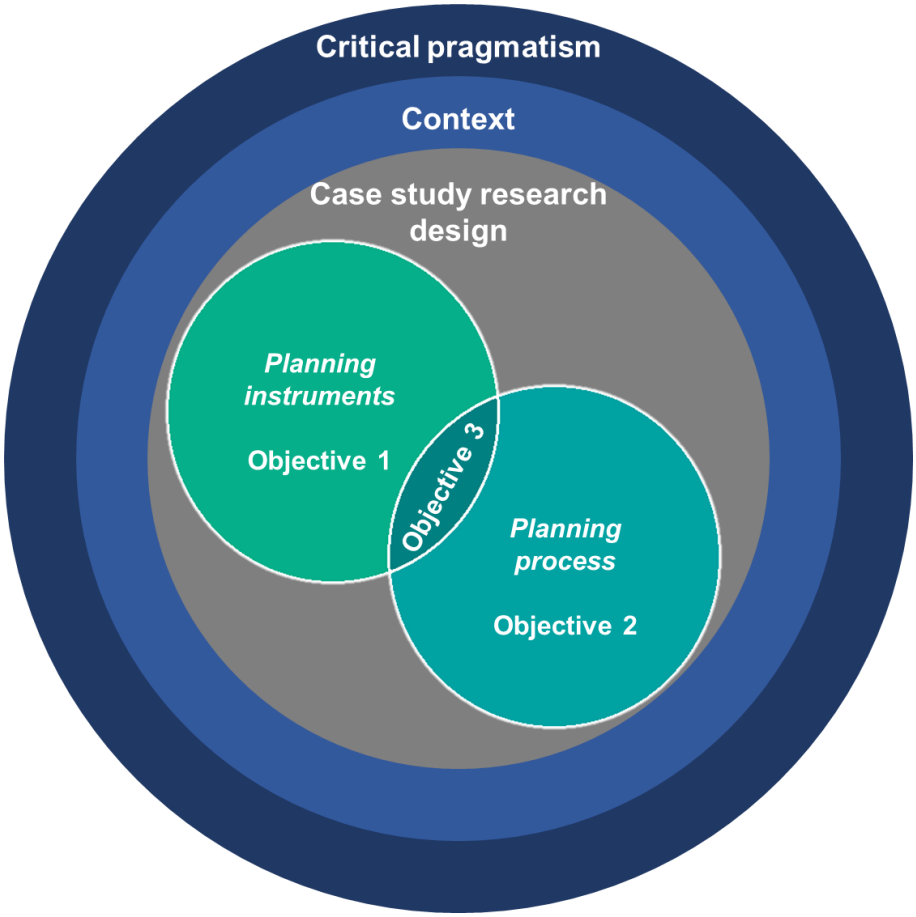

Figure 2: The relationship between critical pragmatism as the methodological paradigm, the research design and the research objectives.

This research is also largely inductive in that it did not begin with a pre-established theory, but rather with an observation, and that meaning is generated from the data collected (Creswell, 2003). The observation was, as discussed under Section 1.1, that local government is vulnerable to the impacts of climate change and that mainstreaming response and adaptation is a way to reduce these vulnerabilities while also fulfilling requirements in terms of their developmental mandate. The motivation was to explore this observation to be able to expand the knowledge-base and to be able to offer real-world solutions to local government. Inductive reasoning is applied by observing a sample (of cases) and then drawing conclusions about the population (to which such cases may apply) (Leedy and Ormrod, 2013). The conclusions being recommendations in this research. In the following section, the overarching research design is discussed.

1.5. Overarching research design

This study has what is termed an 'overarching' research design that encapsulates standalone research components (objectives), each with its own design. The overarching case study research design is discussed below, as was introduced in the section above and Figure 2. The relevant data collection and analyses methods are discussed in the subsequent chapters.

1.5.1. Case study research

Case study designs are recommended where the phenomenon is not easily distinguishable from its context, and are thus well-suited to critical pragmatism as an approach to research, since case studies allow insight into practical or context-dependent knowledge (Yin, 2013). Bent Flyvberg, based on the works of Bourdieu and Dreyfus, argues that "context-dependent knowledge and experience are at the very heart of expert activity" (Flyvbjerg, 2006, p. 5), and a case study research design is therefore key to this method of learning towards true expertise.

This research used a comparative case study design. Two local government cases were purposefully selected to include one metropolitan municipality and one local municipality. The reasons for this selection are discussed in Section 1.5.2. Seawright and Gerring's (2008, p. 296) definition of a case study design is "the intensive analysis of a single unit or a small number of units (the cases), where the researcher's goal is to understand a larger class of similar units". "Comparative case studies involve the analysis and synthesis of the similarities, differences and patterns across two or more cases that share a common focus or goal" (Goodrick, 2014, p. 1). A comparative case study design is typically used when there is a need to understand and explain how certain contextual factors and processes influence the success of an initiative. It is especially useful for making recommendations for achieving certain outcomes in different contexts (Goodrick, 2014).

Case studies as a research design are especially suited to research where the aim is to learn something rather than proving something, particular to the social sciences (Flyvbjerg, 2006). Comparative case study research can contribute to an understanding of the multiple actors, conditions, and processes that can contribute to the successful mainstreaming of adaptation. Comparative case studies allows one to examine the conditions that are common between the cases and those that are different and context-specific. By making use of cases, this study is able to explore the unique events and dynamics of mainstreaming adaptation within municipal planning, identify common themes between cases, offer contextualisation, and to formulate recommendations.

1.5.2. Case study selection

Case study selection requires careful consideration as case selection and case analysis "can scarcely be separated when the focus of a work is on one or a few instances of some broader phenomenon" (Seawright and Gerring, 2008, p. 294). As with this study, where the intention is to learn and gather information, the cases are about more than the case itself and expected to represent a population of cases, and representativeness is of special importance. The case selection process was information orientated, i.e. the purpose was to find cases that would be able to offer the most information and insight on the phenomenon of mainstreaming. Flyvberg (2006) argues that the selection of representative or random cases might not produce as much knowledge or evidence as “extreme” cases, since they activate more actors and mechanisms and are able to offer insight into the deeper causes behind a phenomenon, rather than merely offering descriptions. “Extreme” or atypical cases fall outside of the norm of the population and are able to demonstrate certain overarching principles that help illustrate patterns that could be common among other cases (Flyvbjerg, 2001, 2006). For this research, I select both atypical cases and cases that are representative of the population. Below I explain how the cases were selected to be both atypical and representative, based on certain selection criteria. Looking at local government across South Africa, I selected one case each from a population of 205 local municipalities and eight metropolitan municipalities, respectively. In South Africa all local municipal planning is governed by the same legislation and requirements, making all municipalities comparable, as well as representative, when considering planning instruments and largely, planning processes. Cases were strategically, and purposively selected based on certain criteria to identify atypical cases that are information-rich. Table 1 shows the criteria for the selected cases as well as the rationale behind the criteria.

Two cases were selected using the criteria captured in Table 1, but that were also very different from each other in terms of their context, as will be explained below. This way the cases are first and foremost, comparable, then broadly representative of the population that in turn also provides a strong basis for generalisation to other municipalities. Other factors that influenced case selection included:

- availability of and access to information such as plans, policies and strategies,
- logistical considerations such as travel time and costs to visit case study areas, and
- expected willingness of the municipality to participate in the study.

Table 1: Case selection criteria and the supporting rationale.

Criteria	Rationale
a) **The municipality must have developed a climate change response plan, or a similar plan or strategy to address climate change, at either local or district level.**	This criterion is in support of identifying cases that have access to some level of climate information that can be used or drawn from to inform and guide mainstreaming. This criterion also supports the selection of cases that have undertaken mainstreaming.
b) **The municipality must be recognised as having undertaken mainstreaming climate change response and adaptation into at least their IDP and/or SDF as the key planning instruments.**	This criterion is in support of identifying atypical cases, i.e. cases that fall outside of the norm. The norm in this instance being municipalities that have not, or have only attempted limited mainstreaming of climate change response and adaptation into their planning instruments and processes.
c) **There should be a clear champion within the municipality that drives climate change and adaptation. The champion can be an individual or a department within the municipality.**	This criterion is to ensure that there is some form of commitment or leadership to support climate change mainstreaming within the municipality.

The case study selection was made following initial research on potential cases. The process involved web-based searches and informal inquiry with persons experienced in local government and climate change adaptation in the then Department of Environmental Affairs, now DEFF, SALGA, the Development Bank of Southern Africa (DBSA), and Local Governments for Sustainability (ICLEI) Africa. Based on the background research conducted on suitable case studies and measuring them against the set-out criteria, the City of Cape Town Metropolitan Municipality in the Western Cape province (hereafter Cape Town or the City) and Thulamela Local Municipality (hereafter Thulamela or the Municipality), a largely rural municipality in the Limpopo province, were selected.

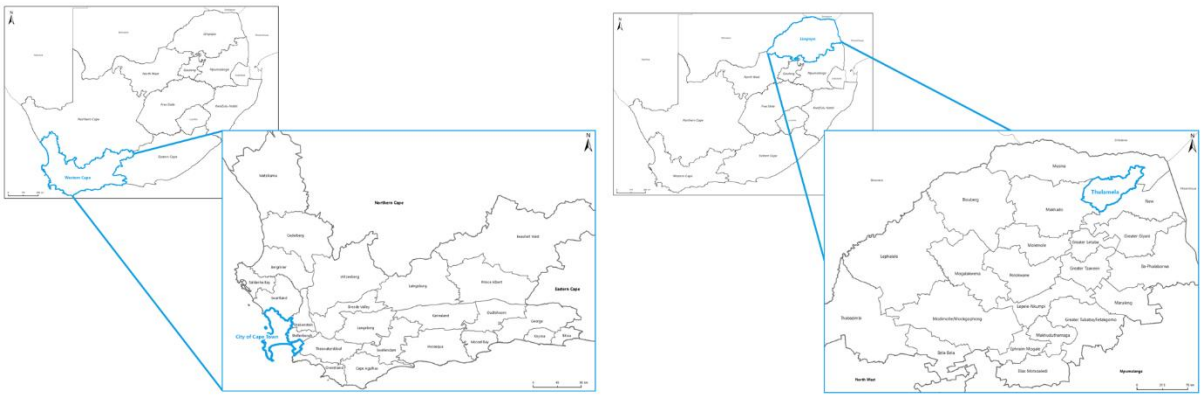

Figure 3: Location of cases in South Africa. Cape Town to the left, and Thulamela to the right.

The two cases provide examples and experiences of climate change response mainstreaming, specifically adaptation, from two distinct contexts. Cape Town has driven mainstreaming internally and is also generally recognised as having to a certain level of success, mainstreamed climate change adaptation into planning (Carmin and Anguelovski, 2009; Mukheibir and Ziervogel, 2007; Pasquini et al., 2015; Ziervogel and Parnell, 2010). Thulamela has received support from the national government to enable and drive mainstreaming, is generally poorly capacitated and not widely recognised as a well-known success story when it comes to mainstreaming, although having been working on mainstreaming for some time (Lethoko, 2016; Sithole, 2016). The two cases also face different climatic challenges, as they are in different climatic regions of the country and have different internal capacities and resources to support mainstreaming, as is detailed in Section 2.4. As mentioned earlier, the selected cases can be called atypical cases, as they were specifically chosen because they demonstrate certain overarching principles that help illustrate patterns that could be common among other municipalities in South Africa (Flyvbjerg, 2001, 2006). Cape Town and Thulamela are actively working on climate change mainstreaming, which does not seem typically to be the case for municipalities in the country at present (Lethoko, 2016; Santhia et al., 2018). The two cases are atypical based on their climate change efforts. Using atypical cases allows insight into the approach followed to mainstream climate change adaptation into planning from two cases with very different contexts and organisational structures. Such a research design makes possible a detailed investigation of a small number of information-rich cases, rather than a high-level investigation of a large number of cases. This design, in turn, allows contextually valid findings to emerge that still have relevance to a larger population of cases because of the comparability of local government planning functions. The purpose of the research design and case study selection process is to not oversimplify the cases, but rather to provide insight into 'real-world planning' through recommendations (Geertman, 2014). As Flyvbjerg (2006, p. 9) argues, "…the strategic choice

of a case may greatly add to the generalisability of a case study", or as is the case in this research, to contribute to providing valid recommendations.

1.6. Delineations and limitations

Given the complex and nuanced reality of local government in South Africa, it was necessary to delineate the study to be able to navigate this context and be able to address the research objectives fully. This research did not look into implementation and can therefore only hypothesise about the success of the implementation of the plans that were assessed. Some insight is provided into implementation based on the interviews, but this was not the purpose of the study. The focus was on municipal planning instruments and the planning process. The content of planning instruments were assessed and might not be an accurate or complete reflection of reality. Although interviews were done to explore some of the processes behind the plans and to gain insight into the approaches taken, and the challenges and successes of mainstreaming, they cannot provide a comprehensive overview of the extent of climate change mainstreaming within the cases. The unit of analysis in this study is local government, and it would be naïve not to acknowledge the multi-layered and complex context of local government and the fact that this research would not be able to provide a full view of the power structures that underlie it and impact this may have on all actions and decisions.

This research studied two cases at a specific point in time to make judgements on a complex phenomenon. As discussed earlier, given the nature of planning in South African, the research design and the case selection process, some generalisations can be made. However, conclusions and recommendations made should be considered suggestive rather than prescriptive. Additionally, research is not a linear process and emotions, preferences and intuition influence the process of inquiry throughout. Any statement made about results is influenced by beliefs and standards of the researcher and those of research participants, which may or may not be shared with others. For this reason, to ensure validity and reliability in results and assertions related to the results, the process of inquiry is communicated to be as transparent as possible.

1.7. Outline of chapters

In the first chapter the rationale for climate change adaptation mainstreaming, and the relevance of such mainstreaming in planning on the local government level was introduced, as well as the aim and objectives of the research. The first chapter also presented the

paradigmatic framework based in critical pragmatism that underlies this study, the overall research design, and some of the key concepts and definitions used. The delineations and limitation of the study are also acknowledged in the first chapter.

Hofstee's alternative dissertation structure is followed, where the study is divided into two standalone pieces of research, each with its own methods section and literature instead of standalone literature and methods chapters as with traditional structures (Hofstee, 2006). In the chapters that follow, the three study objectives are explored. In order to achieve objective one, Chapter 2 provides an assessment of core planning instruments from the two cases to determine the extent to which climate change adaptation is mainstreamed. In Chapter 3, the conditions and factors that have either hindered and/or enabled the process of mainstreaming climate change adaptation into planning are investigated, in support of achieving objective two. The data collection and analysis methods employed and the results are discussed within each of these two chapters. Addressing objective three, Chapter 4 offers a synthesis of the research and provides recommendations on what local government can do to support more effective mainstreaming of climate change adaptation into planning instruments and processes. Concluding in Chapter 5, some of the main research findings are highlighted, and the contributions made to local planning practice and the discourse on the role of planning in climate change adaptation mainstreaming through this research are mentioned. Future research opportunities are also identified and briefly discussed.

CHAPTER 2:

THE EXTENT TO WHICH CLIMATE CHANGE ADAPTATION IS MAINSTREAMED INTO MUNICIPAL PLANNING INSTRUMENTS

2.1. Introduction

In this chapter, I explore the extent to which adaptation as a climate change response measure is currently mainstreamed into municipal planning instruments. This is done through a content analysis of official, legislated planning instruments that apply to local municipal planning in Cape Town and Thulamela. Both the cases have worked towards mainstreaming climate change response into their planning for a number of years, following different approaches.

A literature review is provided that reflects on the role of local government and municipal planning in climate change adaptation and climate change adaptation mainstreaming. The methods used to address the first objective of the study are discussed. An analytic framework is then introduced to analyse IDPs, SDFs and BEPPs, where relevant, as the core planning instruments used in the two cases. The cases are then introduced, and their policy and institutional contexts discussed. The results are provided in terms of the analytic framework and discussed in terms of mainstreaming throughout the dimensions of the planning process. The results are discussed and compared between the two cases.

2.2. Literature review

2.2.1. Climate change adaptation as a multi-scale, multi-actor process

Global political efforts to mitigate or reduce greenhouse gas emissions have not been as successful as needed to be, and adaptation in addition to mitigation is very important to further climate change policy and action (Bassett and Fogelman, 2013). Developing countries are withstanding the worst of climate impacts, and adaptation is a critical climate response measure. Adaptation as a climate change response measure started gaining traction in climate change literature since 1996 with the release of the second climate change assessment report by the IPCC, but it was after the third assessment report in 2001 that adaptation really started to be used widely (Bassett and Fogelman, 2013). Climate change adaptation was once considered a taboo subject, because all efforts were focused on mitigation, and adaptation was considered as a defeatist approach, but is now being institutionalised across geopolitical scales and complemented by bottom-up adaptation planning in local governments (Preston et

al., 2015). An increase in attention to adaptation in science has been accompanied by a simultaneous growth in adaptation practice, but evidence suggests that an 'adaptation deficit' or 'implementation gap' remains as implementation is limited in both developed and developing countries (Preston et al., 2015; Runhaar et al., 2018). There has been a call for more science for adaptation, as opposed to science on adaptation, to offer solutions to local governments tasked with implementation (Bohman et al., 2018). Preston et al. (2015) call for greater integration between climate change adaptation science and practice as a way to address the 'implementation gap'.

In a study by Preston et.al. (2015), some heuristics around adaptation were tested in international literature. One of the heuristics was that "adaptation is local" and the study found that the perception of adaptation as a predominantly local process, has been engrained by a general emphasis on the context-specificity of adaptation. Of the assessed literature that used language consistent with the heuristic of "adaptation is local", 59% supported it, 8% were critical of it and 33% were neutral (Preston et al., 2015, p. 472). Although the impacts of climate change are felt at the local level, and the local level is well-positioned to adapt to climate change, local action needs to be framed and facilitated across the various levels or spheres of government (Juhola and Westerhoff, 2011). "Climate change adaptation as a policy issue is cross-cutting, multi-disciplinary and multi-sector by necessity, requiring significant degrees of collaboration and cooperation in order to be successful" (Moloney and Fünfgeld, 2015, p. 2). Adaptation as a multi-scale, multi-actor process is needed to enable researchers as well as practitioners to develop scale-specific opportunities for adaptation (Preston et al., 2015, p. 474). The recognition that climate change adaptation requires coordination across government levels and spheres does not preclude the fact that climate change responses, particularly adaptation, are positioned locally. Local governments are most sensitive to risks and vulnerabilities and have a distinct role to play in adapting to climate change (Sanchez-Rodriguez, 2009; Carmin, Anguelovski, et al., 2012; Moloney and Fünfgeld, 2015; Chu et al., 2016; Chen et al., 2016). Cities and towns are the spaces where climate change is felt, through both short-term events such as disasters and long-term impacts such as temperature or sea-level rise, and where opportunities lie to address it (Chen et al., 2016). In a study by Chu et al. (2016), they assessed how civil society actors contribute to adaptation planning and implementation by examining experiences of Quito in Ecuador and Surat in India. They found that adaptation approaches must be designed and modified according to local institutional strengths, civil society capacities, and urban climate adaptation needs, which highlights again the importance of context-specificity in adaptation planning.

The challenge in the governance and planning of local spaces is that it involves complex interactions between a diverse range of governmental and non-governmental role players and stakeholders (Oranje and Van Huyssteen, 2007), which is equally true for climate change adaptation (Preston et al., 2015). Sanchez-Rodriguez (2009, p. 203) argues that adaptation to climate change requires both bottom-up and top-down approaches to reduce vulnerability, however the cross-scalar nature of climate change adaptation can emphasise already existing challenges with intergovernmental coordination. Governance structures and leadership to address climate change adaptation varies widely between levels and spheres of government across the world, but intergovernmental coordination challenges are common (Neil Adger et al., 2005; Mukheibir and Ziervogel, 2007; Juhola and Westerhoff, 2011; Forino et al., 2014; Oulahen et al., 2018). In Chapter 1 the arrangements and mandates for addressing climate change adaptation, or rather the lack of clarity that exists around these, within South Africa was introduced – which ultimately make it difficult to determine clear areas of responsibility. For local government to be able to effectively plan for climate change adaptation and to ensure that decisions are not overridden by minority agendas, there needs to be a uniform national adaptation policy to overcome certain power inequalities that are bound to emerge between various levels of government (Mukheibir et al., 2013; Forino et al., 2014). There is a clear policy framework provided by the South African national government that can enable this (particularly through the NCCAS and the Climate Change Bill), although this framework has its limitations as mentioned Chapter 1, Section 1.1, principally that it is not enacted yet.

2.2.2. Climate change adaptation and local government planning

Recently, adaptation in the conventional sense of incremental adaptation to avoid harm from climate change impacts is considered as only one part of the process to build resilience to the impacts of climate change (Kates et al., 2012; Ajibade and Adams, 2019). Transformational adaptation would involve institutional changes in terms of urban planning to change the approach to and management of risks and vulnerabilities (Pelling et al., 2015; IPCC, 2018). This interpretation of transformational adaptation by the IPCC and academics alike recognises the role of urban planning as a key component of transformational adaptation, which addresses the root causes of risk and vulnerability. Planning is accepted as an important policy instrument for addressing both the causes and the impacts of climate change (Hagen, 2016). The role of planning in adaptation is widely recognised, but planning is also positioned to support mitigation through land-use planning systems that can facilitate community design, transportation networks and development densities in support of reducing greenhouse gas emissions (Hagen, 2016). Wamsler et al. (2014) argue that “adaptation is not a separate

process but an integral part of urban planning; a coherent integration of climate change-related issues could thus generate multiple benefits from different sectoral policies". Mainstreaming within planning instruments is identified as crucial to support successful implementation of climate change adaptation, but is often undermined by poor data and lack of technical expertise in climate change and adaptation (Vincent and Colenbrander, 2018; Göpfert et al., 2019).

Planning interventions can have unintended or unanticipated consequences and can trigger maladaptation, like many other policy instruments (Macintosh, 2013). Maladaptation occurs when an adaptation measure directly increases vulnerability, shifts vulnerability and/or erodes preconditions for sustainability (Juhola et al., 2016). For example, if a city attempts to reduce the impact of heat by increasing vegetation coverage throughout the built-up space, associated increased irrigation requirements would increase water use in the city (Van Niekerk, Pieterse, et al., 2019). Increased water use will be of particular concern where water resources are already under pressure, or where water supply is already vulnerable. However, for this example, there are certain actions that can reduce the risk of maladaptation such as using indigenous, drought-resistant species and using recycled water for irrigation. Measuring planned interventions against long-term goals, and the possible effects they might have is crucial to limit negative impacts and maladaptation that may be caused by certain adaptation measures in certain contexts and conditions (Brooks et al., 2011). However, measurement is very difficult because of the varying nature of climate change and its impacts, and the fact that climate change adaptation and resilience involve complex systems (Tyler et al., 2016). Settlement planners could play a significant role in adaptation because of their influence in defining the form, structure, and function of settlements, but as it is, planning is playing a limited role in adaptation to climate change (Sanchez-Rodriguez, 2009). This is however only true in countries where formal planning is practiced to the extent that may influence such factors such as spatial form and function. South Africa has well-established planning structures, policies and legislation that guide the form, structure, and function of settlements (see Chapter 1).

In South Africa, municipalities are faced with the requirement to do forward planning while facing the challenges of addressing backlogs in service delivery, aging and failing infrastructure, unplanned development in the form of informal settlement, fiscal constraints, capacity constraints and a lack of information or data (Swilling, 2006; Oranje and Van Huyssteen, 2007; Pasquini et al., 2013; Du Plessis, 2014; Pieterse, 2019). These challenges are even greater when coupled with climate change impacts such as increases in the intensity

and frequency of extreme weather events. Flooding events, droughts and heatwaves place further stress on already constrained resources and infrastructure (Sharma and Tomar, 2010). However, because of the pressure on local government to expedite development to address inequalities, and the somewhat uncertain future of climate change, adaptation is often one of a multitude of long-term context-dependent dilemmas that requires urgent attention by the planning profession but is of less immediate concern (Biesbroek et al., 2009; Sharma and Tomar, 2010; Forino et al., 2014). Such tensions should be overcome, since "good planning practices are, by nature, also climate-smart planning practices" (UN-Habitat, 2014, p. 23). For example, planning practices such as land-use management, enforcement of regulations, regular maintenance of infrastructure, proper layout planning, and social facility planning and provision, can all contribute to decreasing exposure and vulnerability of populations and infrastructure, and increasing resilience (Sharma and Tomar, 2010). Efforts to address climate change are often neglected in favour of immediate development dilemmas (Broto, 2014), such as service delivery crises, and many local plans have short-term horizons that are in conflict with the long-term implications of climate change. In the South African context, IDPs and SDFs span over a horizon of five years, as they are often linked to budgeting periods. Somewhat contradictory to these short planning timeframes, SDFs are required to have a long-term spatial development vision statement and plan, as well as to identify long-term risks of particular spatial patterns (Republic of South Africa, 2013). Ultimately, spatial planning and the instruments that guide it, intend to support of long-term sustainable development despite administrative restrictions and contradictions of planning timeframes. There are prioritisation tensions between addressing immediate service delivery needs and city-wide needs in support of sustainable development and resilience in South African local government (Hetz, 2016; Pieterse et al., 2016). This is a problem not unique to South Africa, but common to planning across the world (Wilson, 2006; Sharma and Tomar, 2010; Forino et al., 2014).

Local government functions such as infrastructure and services provision, infrastructure maintenance and integrated development planning can either facilitate adaptation or work against it. Spatial planning that integrates adaptation measures offers opportunities to protect cities against anticipated impacts of climate change, while simultaneously protecting past development gains, and addressing the present development agenda. Climate change adaptation that focuses on a wider range of vulnerabilities (such as poor living standards, lack of infrastructure, and settlement in unfavourable locations) rather than a narrower focus on climate-impact driven adaptation, is more relatable to planners and allow for the identification of more synergies between development and adaptation (Hetz, 2016).

2.2.3. Climate change adaptation mainstreaming

Key to developing appropriate adaptation actions is to have a clear understanding of the problem, namely local climate risks and vulnerabilities, and to be able to spatially identify vulnerable areas (Mukheibir et al., 2013; Kunapo et al., 2018). The important task for local government is to integrate local knowledge and experiences into multi-disciplinary, multi-dimensional and multi-scale approaches that can better guide the configuration of adaptation responses to climate change, and mainstream them into development strategies and planning processes (Sanchez-Rodriguez, 2009). The literature is rich from the developed and developing world making the argument for, as well as identifying possible enablers and barriers to mainstreaming climate change into development planning. The literature is dominated by empirical case studies drawing lessons from practice, with an almost exclusive focus on local government and cities (Roberts, 2008; Sharma and Tomar, 2010; Uittenbroek et al., 2013; Pasquini et al., 2013; Picketts et al., 2014; Pasquini et al., 2015; Rauken et al., 2015; Di Giulio et al., 2018; Reckien et al., 2019). There are a number of enabling factors that can be drawn from the literature. They include strong political and administrative leadership and champions (Chu et al., 2016; Pasquini et al., 2015; Pasquini and Shearing, 2014), internal programmatic incentives and benefits that support adaptation planning (Chu et al., 2016; Department of Environmental Affairs, 2016), the availability of resources such as revenue and capacity (Carmin, 2014; Pasquini et al., 2015), the presence of local networks that generate ideas and knowledge (Carmin, 2014; Chu et al., 2016; Department of Environmental Affairs, 2016; Pasquini et al., 2015), and institutional and political stability (Pasquini et al., 2015). Barriers to adaptation planning and mainstreaming delay implementation and can exclude important issues from the policy process (Uittenbroek et al., 2013). Some of the commonly reported barriers that local governments face in terms of climate change adaptation mainstreaming include securing financial and policy support (Preston et al., 2011; Carmin, Nadkarni, et al., 2012; Eisenack et al., 2014), communicating the need for adaptation to elected officials and local departments (Carmin, Nadkarni, et al., 2012), the persistence of the idea that climate change adaptation is purely an environmental issue (Pasquini et al., 2013; Department of Environmental Affairs, 2016), a lack of expertise and information that is relevant to policy and plans (Goosen et al., 2014; Preston et al., 2011; Vincent and Colenbrander, 2018), and organisational barriers such as fragmentation and lack of coordination (Eisenack et al., 2014; Uittenbroek et al., 2013).

Although more limited, some recommended processes and approaches to mainstreaming are also provided (Ayers et al., 2014; Vincent and Colenbrander, 2018; Göpfert et al., 2019). A common argument across the literature is the important role of planning in mainstreaming

climate change adaptation. Although local government is well-placed to practice adaptation, mainstreaming climate change adaptation is required across levels and spheres of government (Rauken et al., 2015). In addition to mainstreaming climate change adaptation into planning, there are also significant efforts to mainstream into other broad policy sectors such as resource management and disaster risk reduction (Broto, 2014; Runhaar et al., 2018).

Runhaar et al. (2018) identify four main advantages of climate change adaptation mainstreaming to support sustainable change and resilience from published empirical analyses. The advantages are that mainstreaming can create synergistic opportunities within planning and other sectors, it can result in better organisational efficiency, it can result in the implementation of more efficient adaptation measures, and it can promote innovation. Vincent and Colenbrander (2018) identify two additional benefits, namely that mainstreaming can ensure that developmental gains are not undermined by climate change and that it provides an opportunity to build resilience and adaptive capacity. Mainstreaming is also expected to increase policy coherence, prevent duplication and contradictions, and deal better with trade-offs between adaptation and other concerns (Uittenbroek et al., 2013; Rauken et al., 2015). In a meta-study on climate change adaptation mainstreaming research, Runhaar et al. (2018) found that the adaptation mainstreaming 'implementation gap' can often be attributed to a lack of sustained political commitment from higher levels and the lack of effective cooperation and coordination between key stakeholders. Mainstreaming has also been critiqued for diluting policy and focus (Runhaar et al., 2018). Revi et al. (2014) suggest that mainstreaming might not be conducive to transformative adaptation since it makes use of dominant development practices that can be seen as producing and exacerbating risk. As discussed under Section 1.3, it is also argued that mainstreaming is needed for transformational adaptation, as a process of changing dominant development practices, as mainstreaming fundamentally changes the way planning is done (Kates et al., 2012; Pelling et al., 2015).

The way in which cities and local governments integrate climate change into city-wide planning varies (Carmin, 2014; Runhaar et al., 2018). Often local government climate change responses are linked to disaster risk management (Solecki et al., 2015), with response being reactive rather than pre-emptive. In most instances, intentions have shifted towards addressing the root causes of vulnerability (Pelling et al., 2015; Solecki et al., 2015). Some local governments develop dedicated and integrated plans for climate change adaptation while others more often follow a sector-based approach where adaptation measures are superficially considered, and some local governments do not engage in any form of adaptation or mainstreaming. Mainstreaming has been broadly classified in terms of horizontal and

vertical approaches (Wamsler et al., 2014; Rauken et al., 2015; Reckien et al., 2019). A vertical approach implies mainstreaming between all levels of government, often within a specific sector, and is associated with high levels of guidance and regulation; and a horizontal approach implies mainstreaming across broader planning frameworks and sectors, and is associated with high levels of coordination (Wamsler et al., 2014; Rauken et al., 2015; Reckien et al., 2019). Despite the differentiation between horizontal and vertical mainstreaming approaches, their outcomes are not mutually exclusive and successful mainstreaming of climate change adaptation requires that both approaches be applied, particularly in local government practice (Rauken et al., 2015).

2.3. Methods

The objective for this chapter was to determine the extent to which climate change response, with a specific focus on adaptation, has been mainstreamed into key local government planning instruments. As discussed in Chapter 1, Section 1.5, a comparative case study design was used where two local government cases were purposefully selected to include one metropolitan municipality and one local municipality, i.e. Cape Town and Thulamela. In meeting the objective of this chapter, a qualitative content analysis was done that was guided by an analytic framework. Although the study as a whole was approached inductively, a deductive approach was followed to address this specific objective. The data sources and analysis process, as informed by the analytic framework, are discussed below.

2.3.1. Analytic framework

An analytic framework was developed with the aim to support the content analysis process and to guide the discussion of results later on. The framework was developed for this study with the purpose to assess how climate change responsiveness, with a particular focus on adaptation, is mainstreamed throughout the planning process, as reflected through key planning instruments. Figure 4 illustrates the planning process, and how climate change adaptation relates to it. The analytic framework, illustrated below in Table 2, is based on Figure 4 and is informed by research that was recently commissioned by the National Treasury's Cities Support Programme (CSP). The aim of the ongoing research project by the CSP is to develop tools to enable the mainstreaming of climate responsiveness into city planning, budgeting, and projects, focussing on metropolitan municipalities. One component of the research project is to frame the narrative of mainstreaming climate responsiveness in cities and involved a high-level analysis of key strategic planning documents (National Treasury,

2018). The CSP is a programme within National Treasury that works with other national departments to support intergovernmental planning and influence policy as it relates to local government, with a specific focus on metropolitan municipalities. The CSP works with metropolitan municipalities to support effective and efficient investment for development and growth (Department National Treasury, n.d.).

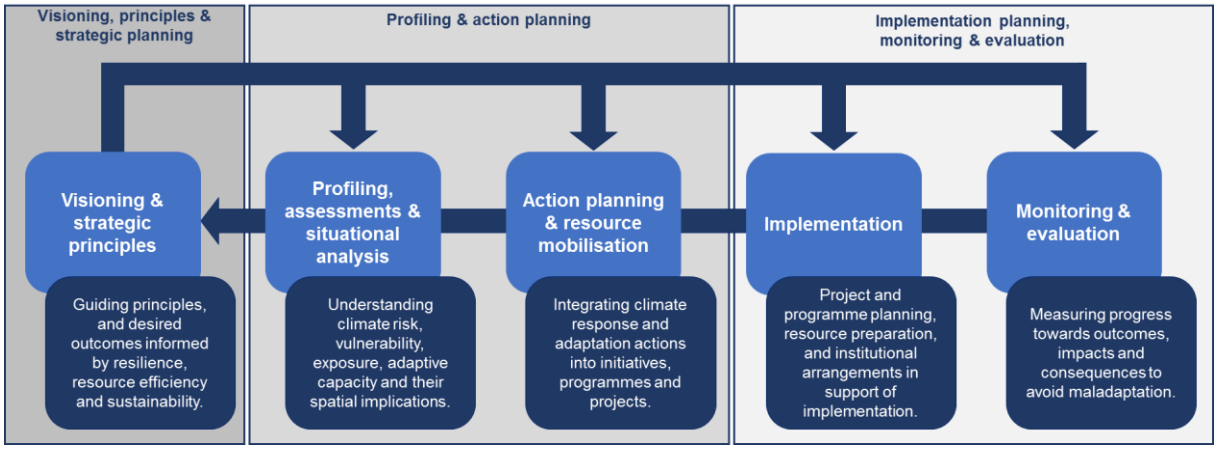

Figure 4: The relationship between the planning process and how climate response and adaptation is meant to be integrated throughout the planning process (adapted from UN-Habitat, 2007; C40 Cities, 2018).

The analytic framework, in Table 2 below, is informed by eight criteria against which planning instruments can be assessed to determine the extent to which climate change adaptation is mainstreamed within them.

Table 2: Analytic framework for assessing the extent to which climate change adaptation is mainstreamed into planning instruments (adapted from (National Treasury, 2018)).

Dimensions	**Visioning principles and strategic planning**	**Criterion 1:** Informs or considers climate change response, resilience and/or sustainability in the guiding principles and strategies.
		Criterion 2: Articulates desired climate change response and/or adaptation goals and outcomes.
	Profiling and action planning	**Criterion 3:** Identifies critical assets that are most at risk and/or exposed to climate impacts, including infrastructure and communities.
		Criterion 4: Identifies resources and/or ecological infrastructure to support climate change response and adaptation.
		Criterion 5: Contains actions or interventions that support climate change response goals and outcomes, i.e. climate change adaptation actions and measures.
	Implementation planning, monitoring and evaluation	**Criterion 6:** Earmarks additional investment or fiscal support for climate change response and/or adaptation.
		Criterion 7: Actions climate change response goals and outcomes through institutional arrangements.
		Criterion 8: Reflects climate change response goals and outcomes in a monitoring and evaluation framework.

Criterion 1 and 2 of the analytic framework assess how climate change adaptation is integrated into the vision, principles and strategic direction provided by planning instruments. The first step to integrating climate change response and adaptation is to recognise it as part of the overall strategy and principles that guide all development within a local municipality, i.e. climate change response and adaptation identified as a priority (Rauken, Mydske, & Winsvold, 2015; Santhia et al., 2018). In support of this, it is necessary to articulate specific goals and outcomes to realise the vision and strategy, as drivers of transformation and impact. Criterion 3, 4 and 5 of the analytic framework assess how climate change adaptation is integrated into the process of interpreting risk and vulnerability to develop, and action responses to these. To integrate climate change response and adaptation into planning instruments it is necessary that climate risk and vulnerabilities are understood (Pasquini et al., 2015; Kunapo et al., 2018; Santhia et al., 2018). When the potential impact of climate change is recognised, the locations and infrastructure that are exposed to risk can be identified, as well as the assets that are able to support response and future resilience. This information and understanding will enable local municipalities to be able to manage, plan and respond effectively. Criterion 6, 7 and 8 of the analytic framework assess how climate change adaptation is considered and integrated into

implementation planning, monitoring and evaluation (M&E). An essential part of the planning process is implementation and ensuring that strategic outcomes were met in the process. The strategic priorities drive budgeting, expenditure and institutional mandates as important components of implementation. To be able to assess impact, it is important to monitor and evaluate the implementation and to ensure that the findings inform future plans and activities.

2.3.2. Data sources

The formally legislated planning instruments used by all municipalities for spatial and operational planning are IDPs and SDFs, and BEPPs in the case of metropolitan municipalities. These planning instruments formed the basis of the content analysis of the two cases to determine the extent to which climate change adaptation was mainstreamed into municipal planning instruments, and are explained in further detail below. The documents were reviewed and scored using the analytic framework.

The content analysis considered local municipal integrated and strategic spatial planning instruments for the year 2018/19 that inform settlement planning in the medium and long-term. The planning instruments assessed in the Cape Town case included:

- Integrated Development Plan, 2017-2022.
- Municipal Spatial Development Framework, 2018.
- Built Environment Performance Plan, 2018/19.

The planning instruments assessed in the Thulamela case included:

- Integrated Development Plan, 2018/19.
- Spatial Development Framework, 2019-2023.

As per the Municipal Systems Act, No. 32 of 2000, an IDP is considered a municipality's single, inclusive and strategic plan that guides the integration and coordination of all other plans related to the development of the municipality, aligns resources and capacity for implementation, and forms the policy framework for annual budgets (Republic of South Africa, 2000). The IDP is in place for the five-year political term and planning cycle, but should also reflect the municipality's vision for long-term development and development priorities. The IDP is updated yearly during this cycle. The Service Delivery and Budget Implementation Plan (SDBIP) is considered as the budgeting instrument of the IDP. The SDBIP details the implementation of service delivery and the budget year for each financial year. The SDBIP sets out the objectives set by the Council as quantifiable outcomes that can be implemented

by the local municipal administration over the following 12 months. The SDBIP provides a basis for measuring performance in the delivery of services. The SDBIP for each of the cases were considered as part of the IDP, and not assessed separately due it not being a standalone, strategic planning document and its scope being very limited.

The SDF is considered a core component of the integrated planning process and the IDP, and should provide basic guidelines for a land use management system (Republic of South Africa, 2000). All SDFs are prepared in terms of SPLUMA and must reflect the development principles, norms and standards of the Act (Republic of South Africa, 2013). Municipal SDFs must represent the spatial development vision of the municipality and guide coherent planning and decision-making across all sectors. The SDF and IDP should guide both private and public sector investment. As opposed to the SDBIP, the SDF is considered a standalone strategic planning instrument and was therefore assessed separately from the IDP.

The BEPP is a strategic, spatial investment planning instrument prepared by all metropolitan municipalities in South Africa, and is not a requirement for other local municipalities. The BEPP aims to support metropolitan municipalities to align investment through spatially targeted priority areas, between sector departments and spheres of government. The BEPP is outcome-led and facilitated by a set of indicators to measure progress on achieving outcomes related to the principles contained in SPLUMA, and ultimately in support of spatial transformation. The BEPP is intended to be the reference point for national and provincial spheres and other key stakeholders to make informed decisions and investments in the built environment of South Africa's largest cities – led by municipal planning. The BEPP also acts as a spatially-driven Capital Expenditure Framework (CEF) for metropolitan municipalities. As from 2019/20 until 2021/22, National Treasury's CSP put forward additional requirements to metropolitan cities to integrate climate response and resilience into their BEPPs (National Treasury, 2018). These requirements are likely to have a positive impact on metropolitan municipalities to be able include climate response and resilience in spatial planning and long-term planning.

These plans and instruments (IDP, SDF and BEPP) were selected because they are the legislated, high-level planning instruments that drive spatial strategy and integration across local sector departments and intergovernmental planning, reflecting the main spatial vision and strategy of municipalities on the local level and are linked to sectoral implementation plans and strategies, and financial mechanisms. Any other plans and strategies that were being implemented and that guide decision-making on development and adaptation planning within

each of the cases, and that provide additional context or clarity to the IDP, SDF or BEPP were also considered, though not analysed. These additional plans and strategies were looked at to provide context and to verify content in the key planning instruments to support the discussion of findings. These included environmental plans, risk and vulnerability assessments and strategies, climate response plans and other guiding strategies that were publically available. The plans, documents and strategies are important to mention here since they exist and fulfil specific purposes in the policy context of each of the cases. The underlying assumption is that dedicated climate response plans are in place because climate change response, adaptation, and resilience are important considerations in the case municipalities and that their strategic planning instruments would reflect this as a priority framed in these dedicated plans. This assumption is based on the criteria for case study selection introduced in Chapter 1, Section 1.5.2.

In the case of Cape Town, the following additional plans, strategies and documents were considered:

- City of Cape Town City Development Strategy, 2012.
- Municipal Disaster Management Plan, 2015.
- Local Biodiversity Strategy and Action Plan, 2016.
- City of Cape Town Climate Change Policy, 2017.
- Environmental Strategy for the City of Cape Town, 2017.
- Draft Cape Town Resilience Strategy, 2019.
- Cape Town Water Strategy, 2019.

In the case of Thulamela, the following additional plans, strategies and documents were considered:

- Vhembe District Municipality Climate Change Vulnerability Assessment and Response Plan, 2016.
- Thulamela Disaster Recovery Plan, 2017.
- Thulamela Local Municipality Disaster Risk Assessment and Prioritisation, Undated.

2.3.3. Data analysis

A qualitative content analysis was undertaken to explore the extent to which adaptation as a climate change response measure is currently mainstreamed into the core local government planning instruments from Cape Town and Thulamela. “Content analysis is an unobtrusive technique that allows researchers to analyse relatively unstructured data in view of the

meanings, symbolic qualities, and expressive contents they have" (Krippendorff, 2012, p. 44). Holsti's approach to content analysis (1969 as cited by Krippendorff, 2012: 46) places content in the context of communication and identifies three purposes of content analysis, namely to ask what, how, and to whom something is said; to ask why something is said; and to ask to what effect something is said. Therefore, the goal of the analysis is to produce empirical knowledge, develop an understanding from the policy, and plan content. The analytic procedure entails finding, selecting, assessing, and synthesising discourse-data contained in plans and policy documents. The analysis then produces data such as excerpts and quotations, organised into major themes as per the analytic framework. The qualitative content analysis process is summarised in Figure 5 below.

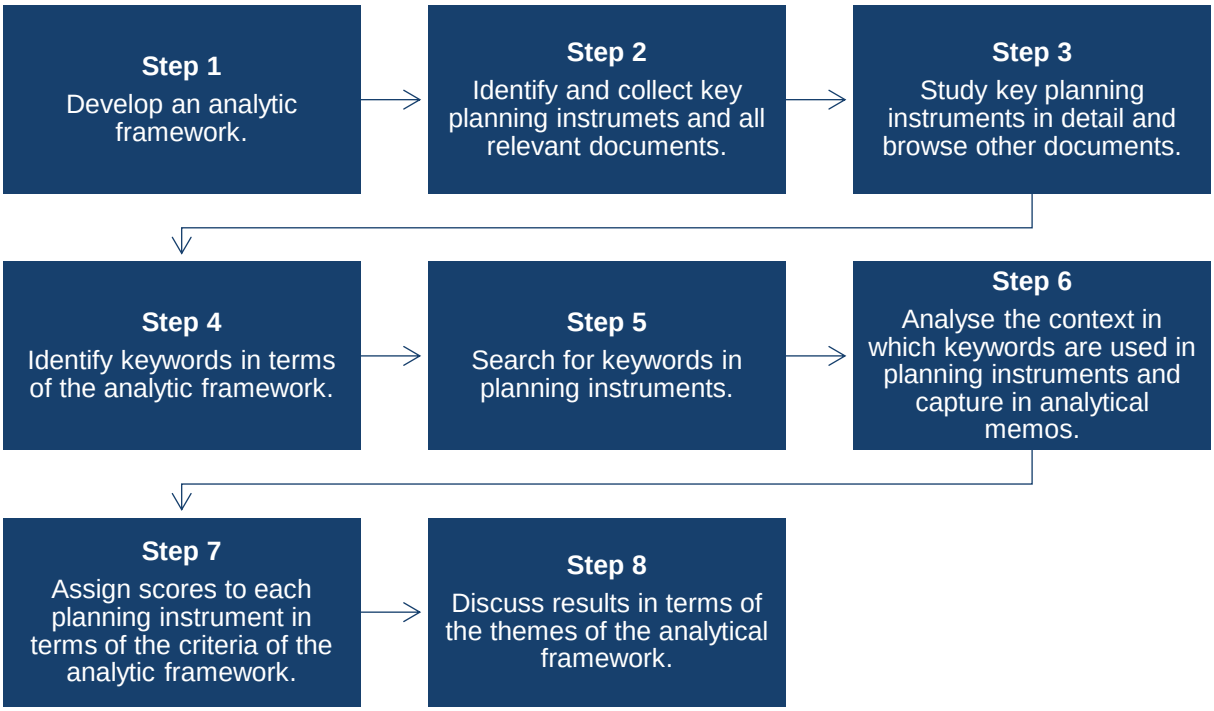

Figure 5: Qualitative content analysis process used to explore objective one of the study.

As a first step, an analytic framework was developed as discussed in Section 2.3.1 and was used to guide and structure the content analysis. The second step was to identify and collect all plans, strategies and documents that would be needed for the content analysis. This process was discussed in Section 2.3.2. The third step was to study the key planning instruments (IDPs, SDFs and BEPP) in detail, and to browse through all the other relevant documents when referenced in the key planning instruments. This process allowed an in-depth understanding of the instruments as well as the strategic priorities of the cases as captured in these plans and documents. Step four was to identify keywords that would respond to the

analytic framework and would be able to direct the rest of the content analysis process. The keywords identified, as well as their derivatives, included ‘climate change’, ‘adaptation’, ‘resilience’, ‘risk’, ‘exposure’, ‘vulnerability’, ‘disaster’, ‘resource efficiency’, and ‘sustainability’. These terms are directly related to climate change adaptation, as per the definitions and literature review provided in Sections 1.3 and 2.2, respectively. As step five, the keywords were searched for and identified in the planning instruments. Step six involved analysing the context in which these words were being used and if, and how they related to climate change adaptation mainstreaming as guided by the criteria and dimensions of the analytical framework. Analytical memos were made during this step that recorded researcher thoughts, interpretations and reflections during the analysis process. The analysis was qualitative and involved deconstructing the text and narratives of these instruments to be able to, as part of step seven, make subjective judgements in terms of the criteria of the analytical framework, and to assign scores to each of the key planning instruments that were assessed. For each of the eight criteria of the analytic framework, each key planning instrument was graded on a three-point scale, where “3” indicates that the plan meets the criteria, “2” meets it in part, and “1” does not meet it at all. The final step was to structure the results and discussion according to the dimensions of the analytic framework. The analytical memos provided valuable structure and input to the discussion of the results.

An appropriate method for assessing mainstreaming is to assess the extent to which climate change is included in development planning and the necessary instruments that facilitate it (Picketts et al., 2014; Lethoko, 2016; Santhia et al., 2018). The ultimate purpose of the qualitative content analysis was to explore the extent to which climate change response and adaptation were mainstreamed into the strategic planning instruments such as the IDP, SDF and BEPP for the two case studies.

2.4. The cases and their policy and institutional context

2.4.1. The City of Cape Town

The City of Cape Town in the Western Cape Province is one of South Africa's early adapters and has actively been working towards interdepartmental collaboration and mainstreaming climate change adaptation into various city plans and processes for almost a decade (Carmin and Anguelovski, 2009; Mukheibir and Ziervogel, 2007; Swilling, 2006; Ziervogel, 2019). The City is one of the main economic centres in the country and faces critical climate change issues such as drought, sea-level rise and wildfires (Mukheibir and Ziervogel, 2007; Celliers

et al., 2015; Ziervogel, 2019; Le Roux, Van Niekerk, et al., 2019). Currently, the City has a population of close to 4 million, which is projected to increase to approximately 5.5 million by 2050 (Le Roux, Van Niekerk, et al., 2019). The majority of this growth is likely to occur in already highly socio-economically vulnerable areas, particularly to the east of the city, and south of the N2 (Le Roux, Van Niekerk, et al., 2019).

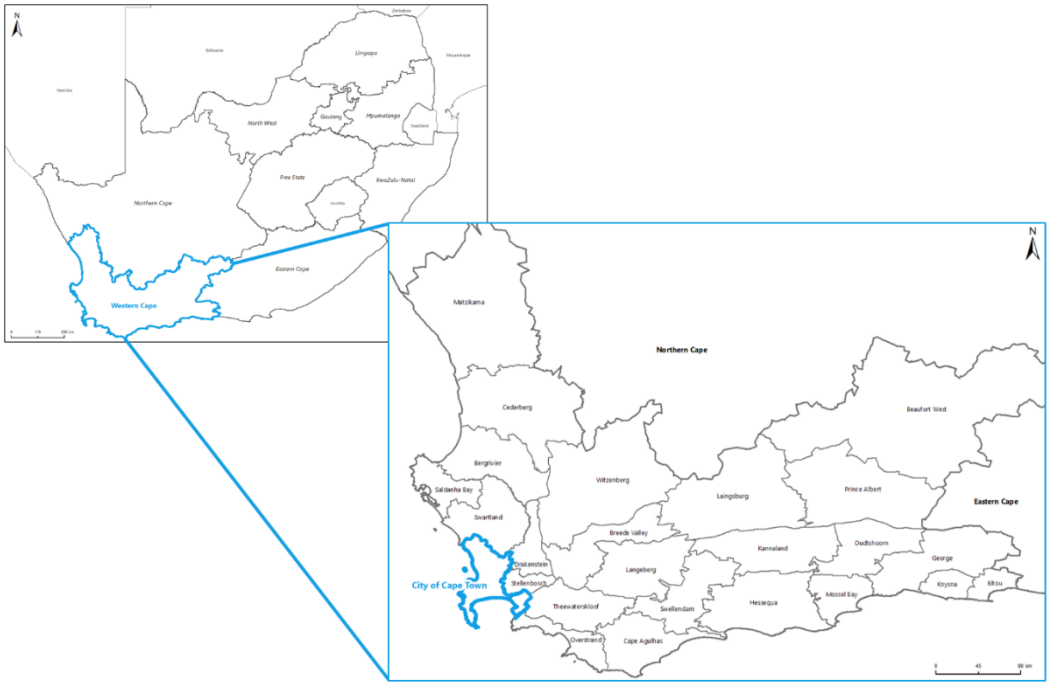

Figure 6: Location of the City of Cape Town in the Western Cape Province of South Africa.

In Figure 7 the vulnerability scores[2] for Cape Town are shown in comparison with the Western Cape provincial average and the national average scores across all municipalities. The City has the highest environmental vulnerability score in the country which reflects the tensions between human activity and influence on the environment such as urban encroachment, the extent of exposed ecological infrastructure, availability of water resources, air quality and

[2] Socio-economic vulnerability consider sensitivity to natural hazards of a population and the ability of the population to respond to and recover from the impacts caused by the natural hazard. The socio-economic index includes variables on household composition, income composition, education, health, access to basic services, and safety and security. Economic vulnerability considers the sensitivity of economic assets and processes in the municipality to natural hazards. The economic index includes variable on diversity and size of the local economy, the labour force, GDP growth and decline, and inequality. Physical vulnerability focuses on the condition of the built environment before a natural hazard occurs. The physical vulnerability index includes variables on road infrastructure, housing type, density and accessibility. Environmental vulnerability considers sensitivity of the environment and ecological infrastructure to the impacts of natural hazards. The environmental vulnerability index includes variables on human influence on the environment, ecological infrastructure, water resources, health and environmental governance. For more information see the Green Book story map on vulnerability (Le Roux, Van Huyssteen, et al., 2019).

environmental governance (Le Roux, Van Huyssteen, et al., 2019). Socio-economic, economic and physical vulnerability is well below the national and provincial averages, having the third-lowest vulnerability scores in the country. Environmental vulnerability is likely to be exacerbated by climate change and the increase in the frequency and intensity of climate-related hazards – which in turn can severely affect households, the economy, and infrastructure.

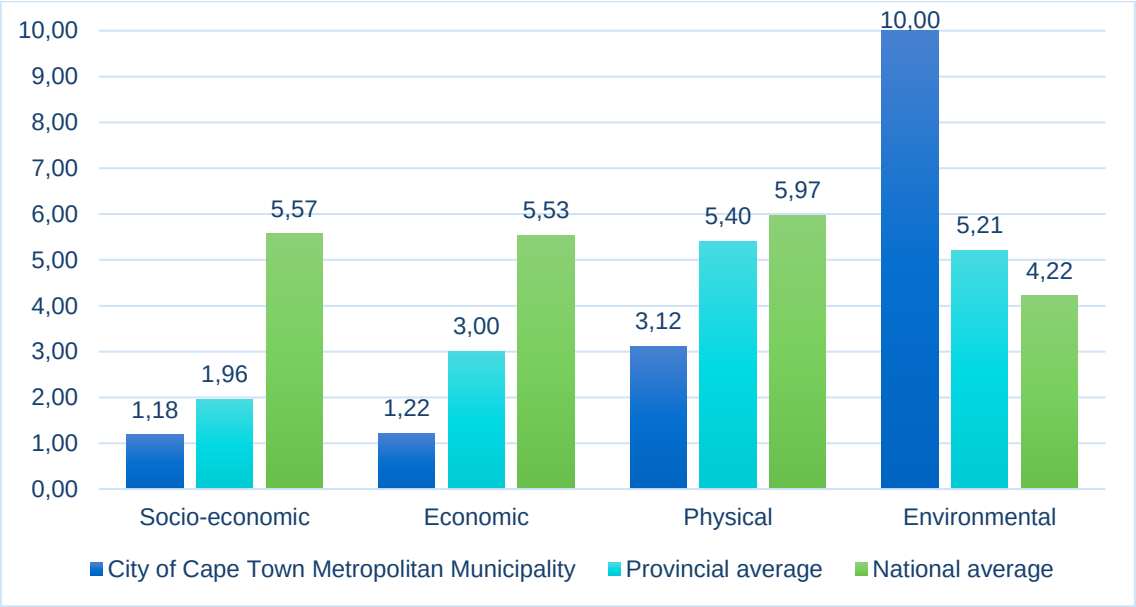

Figure 7: Municipal vulnerability scores for the City of Cape Town, where a score of 1 indicates very low vulnerability, and a score of 10 indicates very high vulnerability (Le Roux, Van Niekerk, et al., 2019)

Projections for the City show that by 2050 average annual rainfall may decrease by around 100mm from the current average of around 500mm per annum (Le Roux, Van Niekerk, et al., 2019). The City is facing extreme increases in drought tendencies per 10 years (i.e. number of cases exceeding near-normal per decade) and increasing water supply vulnerability (Le Roux, Van Niekerk, et al., 2019). The City has committed to building a resilient city through both adaptation and mitigation efforts and supports a number of international agreements and conventions either as a direct signatory or by supporting national commitments (City of Cape Town, 2017a). The City has also committed to developing a resilient city in its strategic and sector plans (City of Cape Town, 2006, 2017a, 2017b, 2018a).

The City's climate change response journey started in 2001 when they developed and adopted an Integrated Metropolitan Environmental Plan (IMEP) along with its implementation strategy, which recognised the relationship between the natural and the built environment and the need

for sustainable development (Mokwena, 2009). Under the IMEP, a number of sectoral strategies were developed in support of meeting the commitments and principles as set out in the IMEP. Since then the City continued to develop a number of policy and planning instruments that further prioritised climate change response and sustainability such as the Energy and Climate Strategy in 2005, and the Framework for Adaptation to Climate Change in the City of Cape Town in 2006 (City of Cape Town, 2005, 2006). In the early years, the focus was largely centred around mitigation with a specific focus on the energy sector, but later the City started to take real notice of adaptation as a way to build resilience across the City.

The City adopted a City Development Strategy (CDS) in 2012 to provide a long-term vision and strategy for the City up to 2040, and since then all new and updated policies, plans and strategies have been developed in alignment with the vision and goals of the CDS. One of the strategic goals of the CDS is to create an eco-friendly city-region (City of Cape Town, 2006). The Western Cape Government's Environmental Affairs and Development Planning Department published the Western Cape Climate Change Response Strategy in 2014, building on the 2008 version, and guides the collective implementation of projects in the province (Western Cape Government, 2014). In 2017 the Environmental Strategy for the City of Cape Town was adopted and replaced the previous IMEP to reflect the City's revised sustainability and development approach as provided through its CDS, IDP and SDF (City of Cape Town, 2017c). The Environmental Strategy undertook to develop a climate change policy and a detailed strategy to provide a guiding framework to respond to climate change in the City. Later in 2017, the Council approved the Climate Change Policy. The vision of the policy is "to become a city that is climate-resilient, resource-efficient and lower carbon, in order to enable sustainable and inclusive economic and social development and environmental sustainability" (City of Cape Town, 2017b, p. 16). With this policy, the City recognises that climate change is a cross-cutting area of work and requires a transversal approach. The city recognises climate change as a major driver of urban change in the City. The city also sees value in the opportunities that adaptation holds, especially in terms of renewable energy generation and supply which can in turn support operations and the development of a 'green economy'.

Considering the major climate risks faced by the City such as drought and water scarcity, adaptation-related projects have largely been around water demand management and alternative sources of water, i.e. water augmentation (City of Cape Town, 2017a). In addition to leadership from the Environmental Management Department, leadership around climate

change response and resilience also comes from the Corporate Services Directorate where the Chief Resilience Officer sits, a position that was created in partnership with the 100 Resilient Cities Programme which is supported through the Rockefeller Foundation (City of Cape Town, 2018b). This Directorate and its leadership are very much involved in City management. The leadership represents the City at the Medium Term Expenditure Framework Municipal Budget and Benchmarking Engagement, hosted by National Treasury. The purpose of these engagements is to assess alignment between planning, budgeting, and reporting and to assess the level of integrated intergovernmental planning.

2.4.2. Thulamela Local Municipality

Thulamela is a largely rural municipality with one urban centre, Thohoyandou, which has a population of close to 180 000 people (Le Roux, Van Niekerk, et al., 2019). It is one of four municipalities in the Vhembe District Municipality in the Limpopo Province and currently has a municipal population of over 460 000 people which is projected to grow to around 570 000 people by 2050, with over 230 000 people in Thohoyandou (Le Roux, Van Niekerk, et al., 2019). The main contributing sectors to the local Gross Value Added (GVA) are government and community, social and personal services, and finance, insurance, real estate, and business services (Le Roux, Van Niekerk, et al., 2019). Agriculture, forestry, and fisheries contribute 1.2% to the local GVA, however, there is also extensive subsistence and emerging agriculture in the area (Le Roux, Van Niekerk, et al., 2019). Thohoyandou (the main centre) and the surrounding rural areas have seen increased frequency and severity of floods and increased high-temperature days (Musyoki et al., 2016). It is projected that Thulamela will be hotter on average by between 2 ^{o}C and 3 ^{o}C by 2050 and are also likely to see an increased risk of flooding in settlements (Le Roux, Van Niekerk, et al., 2019). Thulamela is part of a former Bantustan area and thus has large portions of land that are governed through Traditional Authorities (Nekhavhambe, 2014). More than 60% of settled areas and close to 90% of the total land area in Thulamela are under traditional authority rule (Le Roux, Van Niekerk, et al., 2019; Thulamela Local Municipality, 2019), limiting the influence and impact of the Municipality over land use and spatial planning.

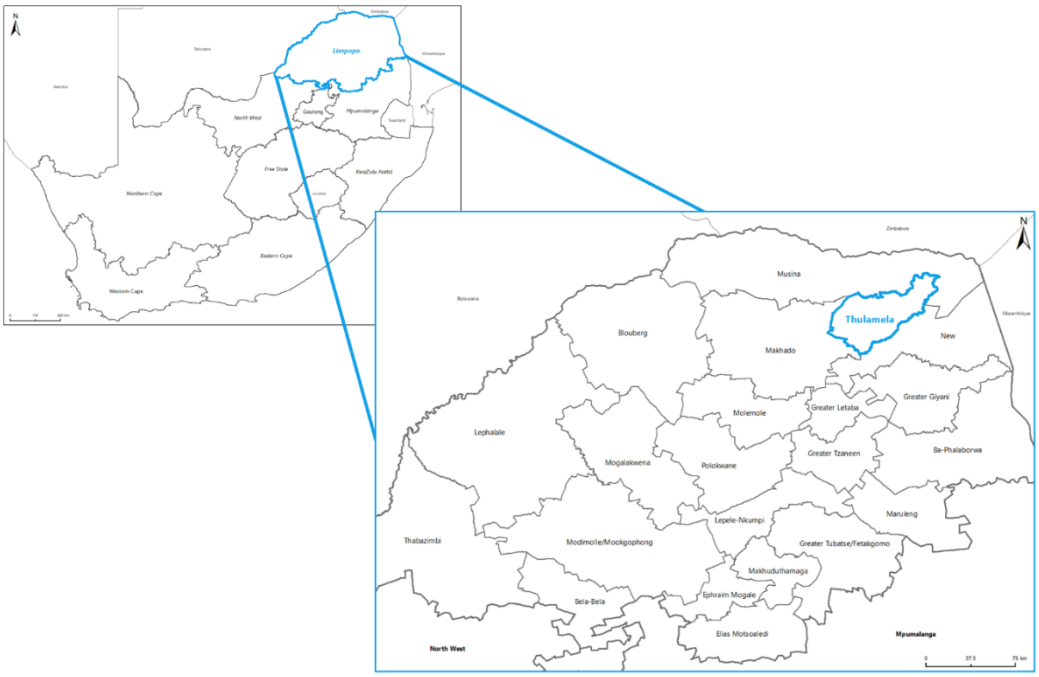

Figure 8: Location of Thulamela Local Municipality within the Limpopo Province, South Africa.

In Figure 9 Thulamela's vulnerability scores (see Footnote 1) are shown in comparison with the Limpopo provincial average and the national average scores across all municipalities. Thulamela is a highly vulnerable local municipality with its environmental vulnerability score being much higher than the national average.

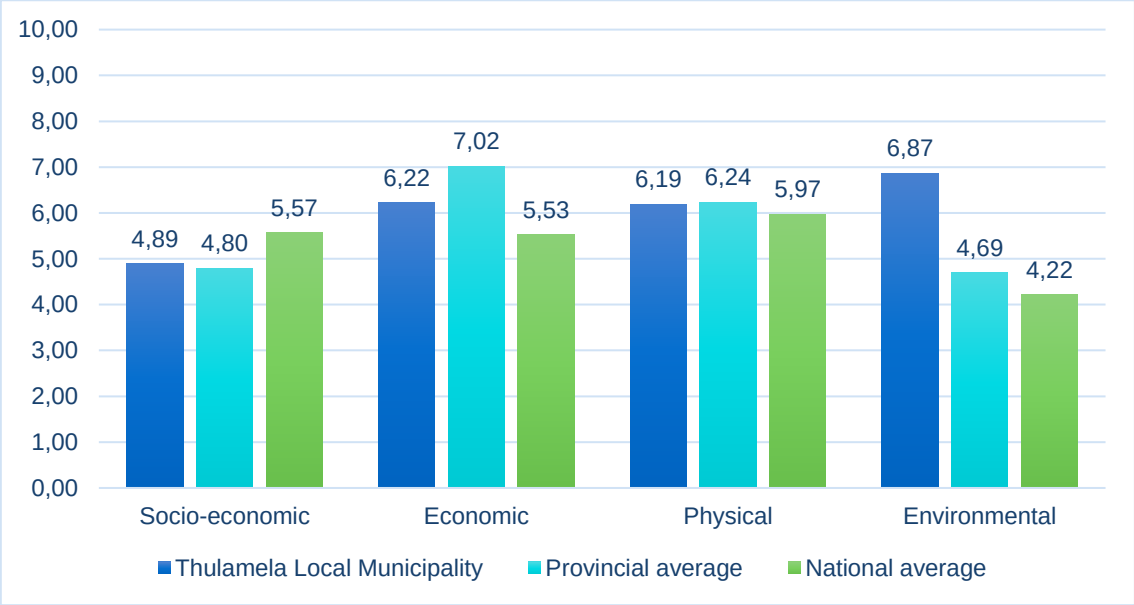

Figure 9: Municipal vulnerability scores for Thulamela Local Municipality, where a score of 1 indicates very low vulnerability, and a score of 10 indicates very high vulnerability (Le Roux, Van Niekerk, et al., 2019)

Thulamela is one of the municipalities being supported through DEFFs LGCCSP. In 2012, the LRT was piloted in five municipalities across South Africa, one of these being Thulamela. The purpose of the pilot was to initially test the effectiveness of the LRT to inform subsequent processes necessary for roll-out to all municipalities in South Africa. Since 2012 Thulamela officials have received some technical training and support on climate change and climate change response through the LGCCSP and developed a better understanding of why it is important to consider climate change in planning and to integrate it in the IDP and throughout project design (Sithole, 2016). Although Cape Town does benefit from the LGCCSP, the LRT has not been a focus in the City (Department of Environmental Affairs, 2014). It is important to note the LRT has not been rolled out to all municipalities and not in any of the metropolitan municipalities in the country (Department of Environmental Affairs, n.d.).

A climate response plan is available on the district level, but not on the municipal level. Vhembe District, through the support of LGCCSP, prepared a Climate Change Vulnerability Assessment and Response Plan in 2016. Thulamela was involved in the process to develop the Vhembe District Climate Change Vulnerability Assessment and Response Plan (Department of Environmental Affairs, n.d.). Thulamela draws from this plan in compiling its IDP, as well as from the information compiled through the LRT during the pilot study. An Environmental Management Plan and a Disaster Management Plan, as required through legislation, are also in place at the local municipal level (Anonymous, personal communication, 16 May 2018). Climate change response falls under the auspice of the Community Services Department in the Municipality, which is also championing efforts around climate change response and mainstreaming (Sithole, 2016). Since the introduction of the LRT and the support that was part of it, it was possible to garner some political support for climate change response and resilience within the Municipality (Sithole, 2016).

2.5. Results and discussion

To determine the extent to which climate change adaptation is mainstreamed into planning instruments, the IDP, SDF and the BEPP were assessed for the City of Cape Town. They were reviewed for the year 2018/19 (City of Cape Town, 2017a, 2018a, 2018c). For Thulamela the 2018/19 IDP and the 2019 SDF were assessed (Thulamela Local Municipality, 2018, 2019). The assessments were done using the analytical framework introduced earlier in Section 2.3.1. Each plan was graded against each of the eight criteria (see Table 2) on a three-point scale, where “3” indicates that the plan meets the criteria, “2” indicates that it meets it in part, and “1” that it does not meet it at all. The case study evidence is discussed in terms of

the three dimensions of the analytical framework, namely (1) visioning, principles and strategic planning, (2) profiling and action planning, and (3) implementation planning and monitoring. The results of the analysis is summarised in Table 3 at the end of this section.

2.5.1. Visioning, principles and strategic planning

The structure and the components that make up Cape Town's IDP are illustrated in Figure 10. The IDP sets forth six guiding principles that guide the strategic focus and implementation within the City (pp.29-31). The first two guiding principles (resilience and sustainability), although broadly defined, do include climate responsiveness in their interpretation (pp.17,30). In the IDP urban resilience and sustainability are considered as core factors in achieving its vision and strategic objectives of building a safe, caring, opportunity offering, inclusive and well-run city (p.30). In addition, in the IDP the City states that resilience, as a guiding principle, should be institutionalised across the organisation and be incorporated into the City's strategic, planning and decision-making mechanisms (p.30).

The IDP includes five strategic focus areas that inform all of the City's plans and policies and reflects the objectives, strategies and development priorities underpinning each focus area (Figure 10). Resilience and sustainability, as guiding principles, inform each of the focus areas, The 'Opportunity City' strategic focus area focuses on the creation of an environment that stimulates sustainable economic growth, investment, and job creation (p.32). 'Objective 1.4: Resource efficiency and security', is the only objective within this strategic focus area that, in an obvious way, supports climate change adaptation and climate resilience.

Under Objective 1.4 the City aims to "achieve an appropriate balance between economic development and the preservation of the natural environment, optimising natural assets, securing resources, and creating a resource-efficient economy" (p.76). The City recognises that to achieve this, resilience will need to be institutionalised in the City's administration and citizenry. The inclusion of Objective 1.4 and including it under the 'Opportunity City' focus area together with objectives around economic inclusion and becoming globally competitive indicates that the City considers resource efficiency, sustainability and resilience as central to development and progress, and echoes statements in the IDP on the importance of institutionalising resilience in the City's administration and citizenry (p.30). There are reference made to disaster risk management under the 'Safe City' focus area as a means to create an environment where citizens feels safe. However, the objective under this focus area is about keeping communities safe in terms of personal safety in public spaces, changing perceptions

of Cape Town as a violent and dangerous space, and strengthen policing (p.84), ultimately losing some connection to climate change adaptation and resilience. The formulation of the City's principles, strategic focus areas and objectives as captured in the IDP illustrates that climate change response, resilience and sustainability strongly informs the guiding principles and strategies of the City, fully meeting criterion 1 of the analytic framework.

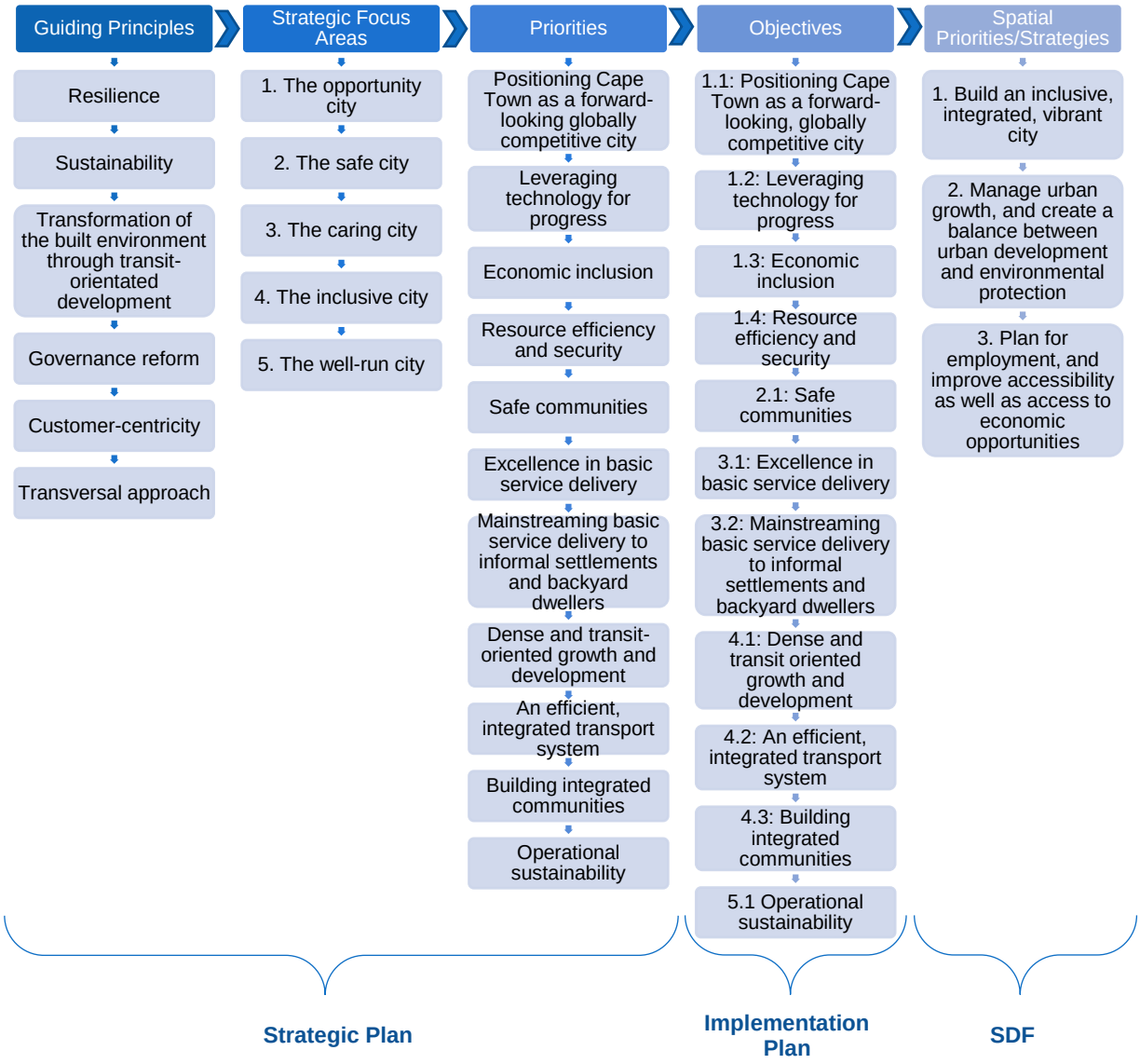

Figure 10: The structure and components of the City of Cape Town IDP showing how the strategic plan, implementation plan, and the SDF components relate to each other within the IDP.

The three spatial priorities of the Cape Town SDF are echoed in the IDP, Spatial Priority 2: "Manage urban growth, and create a balance between urban development and environmental protection"; closely relates to climate response, adaptation and resilience by promoting more sustainable and efficient use of non-renewable resources and infrastructure, and encouraging

the use of natural environment to support spatial justice (p.54). The inclusion of this specific Spatial Priority and the linkages to Objective 1.4 links the strategies and principles of the City to some outcomes and goals that are capture more so in the SDF, but here referred to as 'spatial strategies'. The City does not necessarily articulate outcomes and goals of any kind in the IDP, although they are implied in the priority around resource-efficiency and security (p.37). Because the goals and outcomes implied, but not necessarily clearly articulated, the Cape Town IDP only meets criterion 2 of the analytic framework in part.

The purpose of Cape Town's SDF is to provide policy guidance to direct decision-making on the nature, form, scale, and location of urban development, land-use change, infrastructure maintenance and development, disaster mitigation and environmental resource protection. Within the executive summary of the SDF, the role of resource efficiency and climate-awareness in transforming the City's spatial context is recognised. Particularly in that urban growth, be it formal or informal, should not undermine city-wide resilience. For each of the spatial strategies (referred to as spatial priorities in the IDP), sub-strategies and land use policy guidelines are identified that will be used to manage and promote the main strategy (see Figure 10). The spatial strategies are intended to guide decision-making around development proposals and applications from the public as well as the private sector. Under spatial strategy 2 there are four sub-strategies of which three are strongly linked to climate change adaptation and resilience. These are to use non-renewable resources more efficiently, protect citizens from risk areas, and manage development impacts on natural resources and critical biodiversity networks (p.59). The fourth sub-strategy is to encourage a spatial form that is more compact, and although it is supportive of principles such as resilience, sustainability and accessibility, it is not strongly linked to adaptation. The sub-strategies are to be achieved through land-use management and spatial planning that will (p.59):

- direct urban growth away from risk areas;
- discourage development in the current and future risk areas;
- protect and enhance biodiversity networks;
- reduce the impact of urban development on river systems, wetlands, aquifers, aquifer recharge areas, and discharge areas;
- promote risk-averse and sustainable urban development along the coast and in accordance with the coastal edge; and
- protect valuable agricultural areas, viable farming areas and horticultural areas from urban encroachment, and support urban agriculture.

The City communicates a clear spatial strategy through its SDF, and some of the key strategic directives are strongly in support of climate change adaptation and resilience. Each of the spatial strategies has a number of policy statements that are linked to actions to support the spatial outcomes and objectives associated with the SDF. The SDF provides strong strategic direction that largely aimed to drive growth and development to be adaptive, resource-efficient, and resilience, that can also lead to action through the goals and outcomes of the SDF. Therefore, the Cape Town SDF fully meets criteria 1 and 2 of the analytic framework.

The BEPP reflects the strategic principles and targets established in the IDP and SDF to an extent. It is considered an extension of the IDP and SDF, but does not strongly enough echo what the SDF or IDP state around climate change adaptation and resilience. In all three these strategic planning documents the importance of considering the impact of climate change on the City and inhabitants are implied in the high-level vision and mission statements, as well as the need to mitigate these impacts. Climate change response goals and outcomes are not clearly articulated in the BEPP, despite these existing to some extent in both the IDP and SDF. The vision of the IDP can also be found in the BEPP (p.10) where climate change is mentioned as an important consideration. The BEPP only meets criteria 1 in part and does not meet criteria 2 of the analytic framework at all.

In the case of Thulamela, the IDP identifies ‘strategic objectives’ per Key Performance Area, as well as development strategies which are then linked to a responsible department or agency. This can be found near the end of the document under Section 10: Development Strategies, Programmes, and Projects (pp.251-287). The strategic objectives that have relevance to climate responsiveness and resilience, as captured in these tables, spread across many pages, and include:

- “To ensure integration in rural, urban development and land use control in order to promote sustainable integrated spatial development by June 2019.
- Provision of a clean and healthy environment.
- To ensure and enhance sustainable development in the municipal area of jurisdiction through effective disaster risk reduction.
- To ensure response to all reported cases within 72 hours.
- To ensure effective institutional capacity building.
- To ensure effective disaster risk reduction.
- To ensure well-informed disaster risk assessment.
- To [establish a] disaster advisory forum.
- To provide Infrastructure and sustainable basic services.

- To facilitate and promote the provision of safe and reliable infrastructure".

The strategic objectives listed above are diverse in scale and detail, all may not be considered strategic, and are often unclear as to what they intend to achieve. However, the inclusion of these are indicative of the fact that the municipality intended to include climate responsiveness into the IDP. There are also a number of municipal priorities with associated goals (pp.244-247). Those municipal priorities that relate to climate responsiveness and resilience are disaster management provision, waste management, water supply, and environmental management. The strategic objectives, municipal priorities and goals appear disjointed from each other and suggest that the integration of climate response is occurring in an uncoordinated and non-strategic way. The IDP does not meet either criteria 1 or 2 of the analytic framework because of the general non-strategic nature of the IDP, the way that priorities, strategies and goals are unconnected to each other and how they differ in scale and detail.

Thulamela's SDF is much clearer in terms of the vision and principles than its IDP, and implies that adaptation is needed in the way urban regeneration and comprehensive rural development, as two approaches to achieving the vision, are explained (pp.76-77) . The SDF's development principles are (pp.78-79):

1) Define and protect the municipal open space system.
2) Establish a functional hierarchy of urban and rural nodes.
3) Create an integrated multi-modal transport network system.
4) Ensure spatial targeting of engineering infrastructure investment toward the priority nodal points.
5) Ensure spatial targeting of community infrastructure investment (Thusong Centres) toward the priority nodal points.
6) Facilitate the implementation of Urban Revitalisation Strategies in the identified economic nodes/zones.
7) Protect and optimise the utilisation of high potential agricultural land.
8) Optimise the utilisation of municipal natural environmental resources for tourism development.
9) Promote mining activity and associated job creation potential in an environmentally sustainable manner.
10) Facilitate spatial targeting of industrial development and agro-processing activities.
11) Promote the development of sustainable human settlements in urban and rural areas.

12) Promote the utilisation of local knowledge resource centres in the realisation of the Vision 2030 of the Municipality through the University Town Concept.

Of these 12 principles, principles one and eight are directly in support of climate change response, as they exist to address aspects related to preserving open spaces and the natural environments to realise socio-economic benefits and to maintain a balance between urbanisation and development, and ecological sustainability. There are a number of other principles that can be supportive of climate change response and resilience through the optimal use of land and efficient resource use, depending on how they are realised. The Thulamela SDF fully met criterion 1 of the analytic framework because many of the principles captured are either directly or indirectly in support of climate response, and are indicative of a spatial vision that considers climate change response and resilience in the guiding principles and strategies. The SDF identifies key performance areas and goals as part of its vision and development priorities, although they do not necessarily relate to the development principles or include aspects related to climate change response. Later in the SDF a Sustainability Policy is included which provides a range of outcomes that are directly related to climate change adaptation (p.142). The SDF only partly met criterion 2 of the analytic framework because outcomes for climate change adaptation are captured in the Sustainability Policy, but not as part of the key performance areas that for part of the vision and principles.

2.5.2. Profiling and action planning

Cape Town has three programmes linked to the IDPs Objective 1.4 (pp.76-80). The first programme focuses on energy-efficiency, the second on climate change adaptation and mitigation, and the last on resilience. Part of the Resilience Programme is the integrated resilience project, through which the City's first Resilience Strategy is developed. The resilience programme is supported by the 100 Resilient Cities Programme and the C40 Network. The Draft Resilience Strategy was released for public comment in May 2019 (City of Cape Town, 2018b). As part of the Climate Change Programme, there are a number of projects identified, namely:

- **Adapting climate change project:** The IDP undertakes to conduct a city-wide climate change hazard, vulnerability, and risk assessment. Based on this assessment the City will define adaptation interventions across various sectors and produce an integrated City Climate Action Plan, which it will progressively implement. The Climate Action Plan development is supported through the C40 Cities Climate Leadership Group (C40 Network). Other components will include a comparative assessment of adaptation

interventions (by sector and spatially), updating the City's climate science information, and developing a Cape Town Green Infrastructure Plan.

- **Climate change mitigation project:** The aim of this project is to reduce the City's carbon footprint, contributing to the global reduction of greenhouse gas emissions. There is a range of carbon emission reduction projects in line with the aims of the Energy2040 goals that are to be implemented as part of this larger project.
- **Integrated coastal management project:** In support of managing the City's coastline, they are developing coastal management by-laws to limit encroachment onto sensitive dune areas and protect these areas as they provide natural buffers against storm surges.
- **Biodiversity management project:** Guided by the City's Bioregional Plan, the aim of this project is to restore and manage biodiversity and ecosystem services as a way of supporting resilience to climate change. The project will also focus on optimising socio-economic benefits and opportunities where possible.
- **Invasive species management project:** In line with national legislation regulations, the City will identify, control and manage new and emerging invasive species on all city-owned land to prevent these species from spreading and building viable populations.
- **Green infrastructure project:** The intention is to develop a green infrastructure plan to inform planning and management of natural open spaces and natural systems to be able to sustainably access the ecosystem services that these assets provide, such as flood attenuation, waste absorption, air, and water purification, resource provision, and recreational and cultural benefits.
- **Waste minimisation and recycling project:** The aim of this project is to facilitate re-use and recycling of waste materials to reduce waste to landfill and to contribute to a resource-efficient economy.

All of these activities listed above clearly show that the City is committed climate response and resilience through better understanding risk and vulnerability, particularly of vulnerable spaces and ecosystems such as coasts, The City also commit to minimising waste and recycling, and to develop a green infrastructure plan as a way to provide services and access to citizens in a more sustainable and resource-efficient manner. While mitigation is not the focus of this study, the City's climate change mitigation project does show that they consider both aspects of climate change response. Mitigation links to resilience through resource efficiency, making use of renewable resources, and reducing the anthropogenic contributions climate change (Dodman et al., 2017). These activities are in support of the strategy around

climate change response of the City and constitute climate change adaptation actions and measures, therefore the Cape Town IDP fully meets criterion 5 of the analytic framework.

The Cape Town IDP does not necessarily identify critical assets that are vulnerable to the impacts of climate change, but it does identify the need to do so by identifying the Infrastructure Investment Programme where specific emphasis is placed on the bulk water supply system, and maintenance and protection thereof (p.64). Therefore, the IDP only partly meet criterion 3 of the analytic framework. As part of the Climate Change Programme, certain important ecological assets are identified that are important, particularly in support of climate response and adaptation. For example, the Sir Lowry's Pass River and the Lourens River are both identified as important ecological assets that should be rehabilitated and developed to be able to accommodate major flood events and reduce the risk of flooding in nearby built-up areas (p.78). Therefore, the Cape Town IDP fully meets criterion 4 of the analytic framework.

The Cape Town SDF identifies development directives that are based on environmental risk and social factors that may affect the development potential of certain sites and can trigger additional legislative processes (p.61). Some of the development directives identified include the coastal edge, protected areas, wetlands, utility services buffers, safety zones, fire hazard areas, flooding hazard areas, high potential or unique agricultural land, aquifers, heritage resources, parks, and public open spaces, and infrastructure capacity. All the development directives identified by the SDF are either directly or indirectly in support of climate change response and adaptation. This indicates that the City considers the importance of taking account of high-risk and vulnerable areas in land-use management and spatial planning. As part of the Cape Town SDF implementation plan, specific actions are identified from its policy statements (these are captured on pp.89-94). Among these 23 actions are three that are specific to adaptation. In support of resource-efficient and resilient development, the first action is to clearly articulate and list adaptation and mitigation actions in response to local risks in the built environment. The second action is to finalise the coastal management by-law to be able to regulate activities in the coastal environment, regularly update and delineate areas at risk of flooding, restrict development within 100-year floodlines and within coastal risk-areas, and to consider potential downstream impacts of developments to avoid the transfer of risk. The final action is to support the implementation of the Bioregional Plan and the Green Infrastructure Plan. Because these actions are captured and prioritised in the SDF, it fully met criterion 5 of the analytic framework.

Even though the SDF does not contain a climate risk and vulnerability assessment, urban risk and vulnerability to the impacts of climate change are inherent to the framework. It is mentioned outright in the SDF that it should support a sustainable and resilient development pathway that informs all development decisions (p.1). Vulnerable populations are identified based on a socio-economic index that is used as a proxy for poverty, vulnerability, and areas of high need. The index has been spatialised, but communities most exposed to climate risk are not identified (p.28). Although the City has multiple sources of information to draw from, there are still some gaps in terms of relating it to climate change response and adaptation in space. The SDF, through its status quo analysis, alludes to the lack of adaptive capacity in certain areas due to poverty, lack of access and unemployment, but how this can be exacerbated during extreme events, is not addressed or acknowledged. However, one of the actions arising from the policy statements made in the SDF is to identify critical infrastructure that is at risk of damage and disruption as a result of climate-related impacts (p.92). The SDF acknowledges a severely constrained stormwater drainage system but does not articulate how this can undermine climate change response and adaptation efforts (p.236). On the other hand, the SDF identifies important natural areas or 'Critical Natural Asset areas', and highlights that these areas need to be protected because of the support services they provide and their role in building resilience (p.53). Therefore, the Cape Town's SDF only partly meet criterion 3, while fully meeting criterion 4 of the analytic framework.

The BEPP spatially identifies marginalised areas based on the socio-economic index, as in the SDF. Critical at-risk infrastructure is not identified. Categories of informal settlements are provided that are based on certain criteria of which exposure to risk is one, and specific approaches upgrading are proposed (p.44). The risks that are considered include flooding, fire, and being located in servitude areas, under powerlines or in a protected biodiversity area. Based on the profile or category of an informal settlement, the approaches to upgrading include in-situ upgrading, re-blocking, and full relocation. Informal settlements where there is an immediate risk of one of the hazards mentioned above, full relocation is proposed, whereas if there is a limited risk or risk that can be mitigated, in-situ upgrading, re-blocking and/or partial relocation is proposed (p.41). Other considerations include the ownership of the land which is occupied and the density of the settlement. Including risk and exposure in the analysis of space will enable the City to be able to manage, plan and respond effectively to exposure and climate vulnerability. However, the fact that critical infrastructure, particularly the infrastructure that supports disaster response, is not considered in terms of its exposure to climate risk points to a gap in the City's understanding of their exposure and their ability to respond to disasters. It is for these reasons that the Cape Town BEPP only meets criterion 3 in part. In line with the

SDF, the BEPP identifies important natural areas or ‘Critical Natural Asset areas’, and highlights that these areas need to be protected because of the support services they provide and their role in building resilience (p.26). Therefore fully meeting criterion 4 of the analytic framework.

Water augmentation projects received significant budget allocations, as stated in the Cape Town BEPP and include aquifer extraction and recharge projects, the Zandvliet Water Reuse Plant, and temporary and permanent desalination plants (pp.88-89). These projects can be considered climate change adaptation projects as it is related to securing alternative water sources in support of resilience and resource-efficiency. Water stress has been recognised as an important climate risk for the City, and is expected to increase under climate change, as per Section 2.4.1. Water augmentation was allocated over R 1.5 billion from the 2018/19 capital budget with additional funding requirements identified for the next year. The need for additional funding is identified specifically for maintaining water and sanitation infrastructure in support of sustainable resources management. Maintenance includes infrastructure rehabilitation and replacement. However, it is not explicitly mentioned that rehabilitation or replacement would be done to revised infrastructure design requirements in support of climate response, adaptation or resource efficiency. The inclusion of a number of projects related to water augmentation, as a priority within the City, and other projects such as the rehabilitation of the Black and Liesbeek rivers as part of the Two Rivers Urban Park Transport Orientated Development priority project, offer evidence of actions or interventions that support the climate change response goals of the City (p.258-259). Therefore, the BEPP fully meets criterion 5 of the analytic framework.

Thulamela dedicates a sub-section of its IDP’s Status Quo Analysis to climate and climate change (pp.45-47). Here the major climate-related risks are mentioned, namely flooding, drought, and extreme heat. It is also mentioned that adaptation within the agricultural sector has been happening informally on a community level. The IDP mentions that areas such as "ecosystems, livelihoods, economic activities, infrastructures, and utilities as well as public health and safety" will be used as focus areas to mainstream climate change responsiveness (p.45). Beyond these statements, there is no mention of the overall approach or agenda in the municipality as it relates to climate change response or adaptation.

Water demand and provision is highlighted as a challenge contributing to local vulnerability in Thulamela’s IDP (pp.108-109). Thulamela does not have the mandate to provide water, as the service provider is Vhembe District Municipality. However, water management and water

supply, are priority areas within the IDP and certain actions are identified such as to develop a water master plan, to refurbish water treatment plants and to upgrade sewage works. The IDP also states that current investment in maintenance of water infrastructure is too low and maintenance programmes are falling behind (p.100). What is not clear from the IDP is whether it is actually used to actively guide local investment and planning of water services provision by the District; or if the IDP merely pays lip service to the intention of water infrastructure investment and maintenance without having any impact thereon. The IDP does not create the impression that there is good coordination between the various actors involved in planning in the Municipality. Poor intergovernmental planning and coordination is a common challenge in South Africa (Pasquini et al., 2013; Santhia et al., 2018), and not surprising also in Thulamela where important planning mandates are shared between different spheres of government and a parastatal, and power inequalities are likely to exist (Mukheibir et al., 2013; Forino et al., 2014). The limited control or influence that Thulamela has water services and provision may severely limit its ability to develop climate change adaptation measures and projects related to water.

Even though Thulamela has a Disaster Risk Assessment available for the municipality, it does not seem to have been used to inform planning and decision-making, particularly in the IDP. The Disaster Risk Assessment was developed by an external consultant and was commissioned by the Limpopo Province (Limpopo Provincial Government, n.d.). This may be an indication of uncoordinated planning and lack of communication between sectors and departments in the municipality, and between the municipality and the province. It is also possible that because the Disaster Risk Assessment was completed by an external consultant as well as not commissioned by the Municipality itself, that the value and knowledge generated through the Disaster Risk Assessment were not realised or internalised by officials and as a result, not incorporated into the IDP, which was done in-house. The same concerns and possible risks are raised with the SDF being developed by external consultants; however, the Municipality itself commissioned the work.

Thulamela's IDP makes mention of concerns around the vulnerability of certain infrastructure and assets. This is addressed ad-hoc through the document. There is mention of poor road conditions that could hinder disaster risk preparedness; however, no specific roads that are particularly critical are highlighted (p.64). In addition, the lack of a proper stormwater drainage system, ageing, and poorly maintained infrastructure is mentioned (p.100). Other concerns that are mentioned include land degradation and erosion due to overgrazing and poor farming practices, which are worsened during periods of drought (p.66). Poor spatial planning, high

densities and a lack of implementation of the Land Use Management Scheme, particularly in the more rural and traditional areas, are also identified as challenges in the municipality. High-level qualitative information is provided for air quality, water resources and some of the important ecological areas, all on the district level, informed by the Vhembe District Municipality's Climate Change Vulnerability Assessment and Response Plan (pp45-50). However, no quantitative information is provided, nor are the vulnerable or at-risk areas and resources identified spatially. The high-level qualitative information that is available to Thulamela through the District Response Plan is not appropriate or sufficient to be able to inform the IDP. Even though important ecological areas are mentioned under the Climate Change sub-section of the IDP's Status Quo section, the role of these areas or assets in supporting climate change response is not articulated. It can be assumed that these assets are mentioned in this section because there is some acknowledgement that they play a role in climate change response. High-level qualitative information is used in the absence of information at the right spatial and temporal scale, meaning that Thulamela is not able to identify risks and vulnerabilities or develop responses because information at the right spatial and temporal scale is necessary to inform the development of clear, context-specific adaptation responses (Taylor et al., 2014; Ziervogel et al., 2014). Based on the discussion above, the Thulamela IDP does not meet criterion 5 of the analytic framework at all, and criteria 3 and 4 are met only in part.

"Ecological balance" is central to the conceptual framework of Thulamela's SDF, however no explanation is offered on what it means within the scope of the SDF (p.80). It is inferred from the context it is used in, as well as other references to maintain a balance between developmental needs and a need to protect the environment, that it refers to environmental-developmental balance (pp.14,80,102). To achieve the desired spatial pattern and vision, the SDF identifies five zones, which are the Urban/Rural Development Zone, Corridor Development Zone, Tourism Areas/Zone, Agricultural Zone and the Environmental Conservation Zone (p.99). There are certain development guidelines attributed to some of these zones mentioned above and that are in support of climate change response and adaptation. They include (pp.99-103):

- "An Environmental Management Plan, headed by an Environmental Impact Assessment, should be provided with every new development or change in land use.
- Sound environmental management should be practised by establishing natural core areas and interface areas.
- Encourage the utilization of the environment as an economic asset in order to promote and develop agriculture and eco-tourism.

- Prevent the development of any uses with a negative environmental or visually degrading impact.
- Protect the environment as long-term asset to the community.
- Integrate activities into the environment in a responsible way ensuring the long-term sustainable use and conservation thereof".

In support of the development principles of the SDF as mentioned in Section 2.5.1 and the underlying conceptual framework, spatial planning tools are identified (pp.80-82). One of the spatial planning tools in the SDF is the identification of an urban edge to limit urban encroachment on prime agricultural and environmentally sensitive areas. Within the urban edge, the importance of open space networks and their role in climate resilience is recognised and provided for. The demarcation of an urban edge goes hand-in-hand with other spatial planning tools identified, namely densification, formalisation, and infill development; land use and transportation integration; and a regional open space system. Also in support of the 12 development principles, a number of strategic proposals and projects are identified to realise these principles. There are a number of notable proposals and projects identified that are in support of climate response and adaptation. They range from developing an Environmental Management Plan and an Integrated Open Space Framework, to conducting a wetland study and ensuring strict enforcement of land use management and development by-laws (p84). The SDF contains actions and interventions in support of its development principles as they relate to climate change adaptation and resilience at different scales across the document. Therefore, the SDF fully meets criteria 5 of the analytic framework.

Additionally, local SDFs are developed for the 10 nodal growth points identified in the Thulamela SDF (pp.105-135). For the different growth points across the municipality, a number of development strategies are provided. They are customised for each of the local SDFs and the relevant conditions and context, and a number of them are in support of climate change response and resilience in that they speak to identifying areas that are vulnerable to climate impacts and risks, protecting areas that are able to support climate resilience, and limiting development in areas that are either environmentally sensitive or exposed to climate risks. No specific infrastructure that is in support of climate change response is identified as at-risk or vulnerable to climate change. Apart from mention being made of the Nzhelele River as being vulnerable to erosion and needing to be protected from further development, and a general focus on flood risk (p.130). The SDF states that vulnerable ecosystems are to be protected by buffer zones, but the location of these areas are not identified (p.151). The SDF generally acknowledges the importance of ecological infrastructure throughout the plan, often

prioritising conservation. However, nowhere is the role of any ecological infrastructure stated and the role it can play in reducing risk and increasing resilience. A 100m buffer for perennial rivers and a 50m buffer for non-perennial rivers were demarcated in the SDF since no detailed floodline studies have been done, and identifying floodlines was identified as a strategic project and prioritised in the Thulamela CEF, as part of the SDF (p.103). The purpose of the buffer areas is to protect rivers and associated riparian vegetation from encroachment and hence protecting communities and infrastructure from the risk of flooding. Based on the evidence discussed above, the Thulamela SDF meets criteria 3 and 4 only in part.

Thulamela is dependent on risk and vulnerability analyses that were done on the district level, and which was largely qualitative in nature. In the Vhembe District Climate Change Vulnerability Assessment and Response Plan, limited information is available on the impact of climate change and certain vulnerabilities on towns and cities and their functions and systems. In addition, the resolution at which the assessment took place makes much of the information irrelevant to Thulamela and its settlements. Thulamela has limited resources and capacity to conduct more detailed assessments and therefore rely on district-level information. In contrast, Cape Town has detailed climate change projections and assessments available and are able to commission as well as to conduct in-house research on the impact of climate change on the City, and they are able to develop appropriate response plans. The significant role of information and data in being able to support the process of integration into planning instruments is apparent from the analysis of the two cases. In addition, what was highlighted is possibly the way that information or rather, knowledge is internalised by officials. Where Cape Town has the capacity to develop instruments and conduct research in-house, Thulamela had to outsource some of its processes and it appears that this has limited their ability to internalise and ultimately take-up and integrate the findings, information and knowledge generated through these processes.

2.5.3. Implementation planning, monitoring and evaluation

The Cape Town IDP identifies the Climate Change Policy as the main instrument to support climate change adaptation-specific implementation. The IDP states that “the City will work to ensure that climate change adaptation is integrated with all relevant decision-making processes, cutting across all line functions” (p.78). There is however, no mention made around dedicated funding for climate change adaptation initiatives, but considering the focus on this, it can be assumed that it would receive notable fiscal support within the City. The 2018/19 SDBIP indicates that 60% or just over R5 billion of the Capital Budget is allocated to the

Opportunity City strategic focus area. Three objectives are covered under this portion of the budget where Objective 1.4: Resource efficiency and security, is allocated approximately R2 billion, the second-largest budget proportion dedicated to a specific IDP objective. Dedicating such large portions of the capital budget to projects in support of energy efficiency, climate change and resilience are indicative of a serious commitment to creating a resilient city. Because of the large proportion of the Capital Budget allocated to the IDP objective wherein climate change adaption and resilience is dealt with, but also because no funding is dedicated climate change response initiatives, the IDP only partly meets criterion 6 of the analytic framework. There are also no specific institutional arrangements made to action the initiatives and programmes of the IDP, thereby not meeting criterion 7 of the analytic framework.

The IDP set specific targets for certain indicators as part of the five-year corporate scorecard. Only two indicators measure aspects of Objective 1.4. The indicators measure percentage compliance with drinking-water quality standards and megawatts of new small-scale embedded generation (p.134). When considering the proportion of the budget allocated to this objective and the indicators that are related to it, the outcomes that are measured do not seem sufficient nor effective measures for evaluating climate response, adaptation or resilience, thereby not meeting criterion 8 of the analytic framework at all. Tyler et al. (2016) recognise that measuring adaptation is very difficult because of moving targets associated with climate change and impacts and that adaptation and resilience are results of complex systemic interactions. This is further complicated when integrated into planning, and hence with other actions and interventions.

The Cape Town SDF prioritises a number of implementation actions that are in support of the main goal of the SDF, spatial transformation through intensification (p.xii). None of the prioritised implementation actions are directly climate-responsive or adaptive in nature (p.xv). Given the way in which climate change responsiveness and resilience has been integrated into the main spatial strategies and directives of the SDF (as discussed in Section 2.5.2), the assumption is that these would be expected to inform and guide the prioritised implementation actions. The impact of climate change on urban processes is acknowledged, and efforts to increase resource efficiency and to reduce carbon dependency is encouraged, but no reference is made of formal commitments to these efforts by the City. The SDF is actioned and financed through the CEF, as required by SPLUMA, and the CEF is captured in the BEPP. The SDF does not include an implementation framework or M&E framework. Implementation of the SDF is through the IDP and reporting will mainly occur through IDP-specific structures.

It is because of these reasons that the Cape Town SDF does not meet criteria 6, 7 or 8 of the analytic framework at all.

In the BEPP it is stated that the City has implemented a Transversal Management System (TMS) as a management approach to improve integration and coordination of service delivery and planning (p.145). The tool sits within the existing hierarchical structure but also provides additional platforms to facilitate communication and decision-making across directorates. The purpose of the TMS is to coordinate on issues that span across multiple departmental mandates. Climate change responsiveness and resilience is a cross-cutting issue, and even though not mentioned in the BEPP, one can expect that it would be one of the themes that will be included in the TMS. Although there is a monitoring component to the TMS, detail is not available and it is not possible to determine how projects and initiatives are monitored through the BEPP. It is because of these reasons that the Cape Town BEPP meets criterion 7 of the analytical framework in part, and criterion 8 is not met at all. Through the BEPP guidelines set out by National Treasury, it is required that targets be set for indicators that are reported by the metropolitan municipalities themselves, and those reported from national sources. Currently, no indicator targets are required for climate responsiveness and resilience and therefore not included in the current BEPP, or reported on. Many of the existing outcomes and output indicators already contain inherent climate response elements through the promotion of increased efficiency, reliability, affordability and safety of city services and assets, as well as improved densification, adoption of low-carbon solutions and optimisation of natural infrastructure spaces. Therefore, the BEPP meets criterion 6 in part only.

In the case of Thulamela, the departments and institutions responsible for financing and implementing projects, where these fall outside of the Municipality, are identified in the budget. Other climate change response and adaptation-related projects identified in the IDP, which are funded from outside the Municipality include the following:

- Vhembe Biosphere Reserve project, funded and managed by the Limpopo Department of Economic Development, Environment & Tourism.
- Environmental awareness project, funded and managed by the Limpopo Department of Economic Development, Environment & Tourism.
- A number of projects related to borehole construction and upgrading, funded and managed by the Department of Public Works.
- Water treatment works upgrading and bulk supply lines funded through the Municipal Infrastructure Grant and managed by the Vhembe District Municipality.

Although the mentioning of responsible institutions or departments offer somewhat of an institutional framework to the IDP, it is not related to climate change adaptation and resilience goals or outcomes at all. Most of the projects funded and managed by Thulamela Local Municipality are through the Municipal Infrastructure Grant (MIG) and relate to infrastructure such as roads, bridges and stormwater drainage system upgrading and solid waste management (R141 million in 2018/19). These projects are in response to the climate change challenges and vulnerabilities identified in the IDP, but it is not certain from either the IDP or the SDBIP that the projects will be designed and implemented in a way that will, in fact, reduce those vulnerabilities.

In Thulamela a Project Management Unit (PMU) is located in the office of the Municipal Manager and its functions include to monitor and evaluate the implementation of the IDP and SDBIP, monitor municipal capital budget spent, and to monitor MIG spent (p.192). There is no M&E framework in the IDP but it is captured in the SDBIP. The M&E done as part of the SDBIP is focussed on short-term activities and not necessarily in support of measuring the impact over a medium or long-term. It is largely driven by budgeting and expenditure monitoring. The M&E framework is therefore not able to monitor impact, as Tyler et al. (2016) mentions as a necessary component of monitoring adaptation. Based on the discussion above, the Thulamela IDP does not meet criteria 6, 7 or 8 of the analytic framework.

As part of Thulamela's SDF implementation plan, seven policies are developed, namely an Urban Edge Policy, a Residential Densification Policy, an Infrastructure Policy, a Subsidised Housing Policy, a Sustainability Policy, a Demarcation of Sites in Traditional Authority Areas Policy, and an Incentives Policy (p.136). The Sustainability Policy facilitates sustainable utilisation and management of renewable and non-renewable natural resources to ensure minimal environmental impact from development (pp.142-145). In the Sustainability Policy, recommendations are made for energy efficiency, water conservation, wastewater treatment, sustainable buildings, and waste management. The Policy makes detailed recommendations for buildings, sites and settlement-wide measures that can be taken to adapt to climate change and mitigate the impact of development. Some of the recommendations include using solar energy to heat water, limiting the installation of air conditioners and rather using passive design for cooling as well as heating, installing rainwater harvesting systems, recycling greywater, reducing water pressure to minimise leaks, protecting wetland ecosystems in support of stormwater treatment, using renewable building materials, and encouraging waste separation at source. There are many very useful recommendations made in support of

climate response and resilience and it offers adaptation actions that can be integrated into local spatial plans and projects, and that can assist with implementation.

As part of Thulamela's CEF (which is an annexure to the SDF), there are a number of projects planned for and linked to each of the development principles. Development principle one, 'define and protect municipal open space system', have seven projects to the value of R 15.75 million (p.160). All seven projects are in support of climate change adaptation and resilience. The projects are:

- Develop an integrated open space framework.
- Conduct a wetland study for the entire municipal area.
- Compile a 1: 100-year floodline strategy for all major rivers.
- Develop an Environmental Management Plan for the entire municipal area.
- Compile a maintenance plan for the clearing of open spaces and parks.
- Maintain the municipal open space system.
- Develop a formal pollution contingency plan for all possible and different sources of pollution.

Development principle eight of the SDF, 'optimise the utilization of municipal natural environmental resources for tourism development', has one project related to climate response and adaptation, namely to develop a resources management plan for Nandoni Dam, Lake Fundudzi, Vondo Dam and Mvuwe Dam (p.164). Even though these projects are not identified as projects for climate change response, they do support resilience building. Development principle one can be considered in support of climate change response, adaptation and resilience, even if not stated as such in the SDF. It is because of these reasons that the SDF meets criterion 6 of the analytic framework in part.

The SDF does not propose clear institutional arrangements as part of its implementation plan, or in the Policies discussed earlier. Projects identified in the CEF are prioritised for the next planning cycle, where the planning and implementation agency is already identified. Of the eight projects that are in support of climate response and resilience, three are to be planned and implemented by Thulamela, three to be a joint venture between Thulamela and the Vhembe District, and one to be planned and implemented by the National Department of Water and Sanitation (p.160-164). The arrangements made through the CEF does not necessarily action climate change response goals and outcomes, therefore not meeting criterion 7. The M&E component of the SDF is small and few recommendations are made that are actually clear in terms of outcomes to be measured. One of three intermediate outcomes

identified is ‘protecting the natural and built environment’ as part of a Results Based Management Framework, with ‘quality of the natural and built environment’ as one of six indicators (p.158). Part of the M&E framework are suggestions for qualitative and quantitative monitoring, through auditor assessments, and community feedback sessions and case studies of implemented projects. Therefore, the Thulamela SDF only meets criterion 8 of the analytic framework in part.

2.5.4. Summary

The results of the analysis are summarised in Table 3 against the analytic framework and its eight criteria. Each plan was graded on a three-point scale, where “3” indicates that the plan meets the criteria, “2” indicates that it meets it in part, and “1” that it does not meet it at all.

Using the analytic framework to assess each of the instruments, Cape Town’s IDP and SDF, as well as Thulamela’s SDF scored an average of 71 percent. All three the strategic planning documents assessed for Cape Town, address climate change adaptation in some way and climate responsiveness, resilience and resource efficiency was included in the overall strategy and informed the guiding principles and actions, but less so in the BEPP than in the others. The sections that were the least inclusive or responsive across all the plans considered were those relating to institutional arrangements, and M&E. The discrepancy between the extent to which mainstreaming is occurring in terms of visioning and strategic principles, and implementation planning and M&E is supported by literature in that it has been found that principles of sustainability and resource efficiency are often promoted in guiding policies and frameworks, but this rarely translates into actions and implementation (Pieterse et al., 2016).

Table 3: Case study plan assessments in terms of the analytic framework.

		Cape Town			Thulamela	
		IDP	SDF	BEPP	IDP	SDF
Visioning principles and strategic planning	**Criterion 1:** Informs or considers climate change response, resilience and/or sustainability in the guiding principles and strategies.	3	3	2	1	3
	Criterion 2: Articulates desired climate change response and/or adaptation goals and outcomes.	2	3	1	1	2
	Sub-total	***5***	***6***	***3***	***2***	***5***
Profiling and action planning	**Criterion 3:** Identifies critical assets that are most at risk and/or exposed to climate impacts, including infrastructure and communities.	2	2	2	2	2
	Criterion 4: Identifies resources and/or ecological infrastructure to support climate change response and adaptation.	3	3	2	2	2
	Criterion 5: Contains actions or interventions that support climate change response goals and outcomes, i.e. climate change adaptation actions and measures.	3	3	3	1	3
	Sub-total	***8***	***8***	***7***	***5***	***7***
Implementation planning, monitoring and evaluation	**Criterion 6:** Earmarks additional investment or fiscal support for climate change response and/or adaptation.	2	1	2	1	2
	Criterion 7: Actions climate change response goals and outcomes through institutional arrangements.	1	1	2	1	1
	Criterion 8: Reflects climate change response goals and outcomes in an M&E framework.	1	1	1	1	2
	Sub-total	***4***	***3***	***5***	***3***	***5***
	Total score	**17**	**17**	**15**	**10**	**17**
	Average score	**2.1**	**2.1**	**1.9**	**1.3**	**2.1**
	Percentage (%)	**71**	**71**	**63**	**42**	**71**

In the case of Thulamela, some strategic objectives are only mentioned near the end of the document, and the strategy of the IDP or its priority areas are not clearly articulated and followed through, making it difficult to determine how the strategy is informing planning and budgeting in the municipality. This is even more difficult when having to extract intentions regarding climate response and adaptation, and if these principles are carried through the planning process from strategy to budgeting and implementation. Overall, the SDF met and partially met most of the criteria, while the IDP did not meet most of the criteria. This indicates

that the SDF has integrated climate responsiveness and resilience to a good extent (scored 71%), whereas the IDP did not (scored 42%). The Thulamela SDF places considerable emphasis on the need for approaches and interventions that contribute to the realization of 'ecological sustainability', but do not link this clearly to adaptation interventions, but rather to mitigation interventions related to energy efficiency and renewable energy. The SDF does however provides very clear and useful measures in support of resilience and adaptation in its Sustainability Policy, but how this, and much else of the SDF will be actioned, is not clear since very little information is provided on institutional arrangements. The SDF for Thulamela was developed by a planning consultancy and is more coherent and legible than the IDP, which can be potentially indicative of a lack of capacity to develop quality development plans within the municipality.

2.6. Conclusion

Currently, the planning reporting framework does not appear to facilitate climate-responsiveness and resilience through the indicators that South African local municipalities are expected to report on through their IDP, SDF and BEPP (National Treasury, 2018; Southworth, 2018; Stone, 2018). It is easier to report on activity rather than measuring outcomes related to climate response and adaptation (Tyler et al., 2016). As part of National Treasury's CSP that facilitates and manages the BEPP process, climate-responsiveness and resilience are being introduced as requirements in developing BEPPs by metros. The first requirements were introduced for the year 2019/20 and will be subsequently expanded over three years. However, at this stage, only metropolitan municipalities are required to develop BEPPs. Other planning instruments and related legislation do not explicitly require municipalities to consider and integrate climate-responsiveness and resilience into plans, strategies, decision-making, reporting, and evaluation. The results of the content analysis presented here, support this in that neither IDPs, SDFs or the BEPP from Cape Town and Thulamela performed particularly well when the extent to which climate-responsiveness and resilience were integrated into these instruments, were measured.

In the case of Cape Town, where climate change impacts, risk, and vulnerability have been informing planning responses for many years, climate change response, adaptation and resilience can still not be considered fully mainstreamed into planning instruments. In the case of Thulamela, it is clear that climate change, risk, and vulnerability are considered important aspects to consider within planning instruments such as the IDP and the SDF, but that intentions to mainstream in meaningful and actionable ways have not been realised. Climate

change response is being mainstreamed in a disjointed manner in their strategic planning documents, reflecting poor planning coordination. Evident from the two cases, is that access to information and data related to climate change and impacts are very important. In particular, information at the right spatial and temporal scale. Access to relevant information, as well as knowledge and skills to be able to interpret and mainstream information, is identified as a key enabler for climate change adaptation and mainstreaming (Pasquini et al., 2013; Ekstrom and Moser, 2014; Pasquini et al., 2015; Runhaar et al., 2018).

It is clear from literature and research that it is of critical importance to integrate climate change response, adaptation and resilience into local government planning instruments, and that good planning is by nature in support of resilience. However, both this study and other research (Runhaar et al., 2018; Uittenbroek et al., 2013; Santhia et al., 2018) show that local governments have not fully realised climate change adaptation mainstreaming. This study show that local municipal plans and policies are recognising the impact of climate change on urban spaces and the role of planning in responding to these impacts through intentions. What is not reflected, are programmatic and coherent approaches to addressing these long-term impacts through existing short- to medium- term planning instruments such as IDPs and SDFs, i.e. horizontal mainstreaming remains weak. The South African national climate change adaptation policy has the potential to create a favourable environment to facilitate vertical mainstreaming, however horizontal mainstreaming requires coordination between sectors and actors (Rauken et al., 2015; Reckien et al., 2019; Wamsler et al., 2014). The case study evidence has shown that intergovernmental and cross-sectoral planning coordination remains limited, particularly in a case such as Thulamela.

In this chapter, I explored the extent to which adaptation as a climate change response measure is mainstreamed into local government planning instruments based on a content analysis, guided by an analytic framework. In the next chapter, I will continue my analysis of Cape Town and Thulamela by exploring the conditions and factors that have hindered and/or enabled the process of mainstreaming climate change adaptation into planning.

CHAPTER 3:

ENABLING AND HINDERING FACTORS FOR CLIMATE CHANGE ADAPTATION MAINSTREAMING IN MUNICIPAL PLANNING

3.1. Introduction

There has been a clear call from international and local policy, science, and practice that local governments need to mainstream climate change response into their planning (Uittenbroek et al., 2013; Picketts et al., 2014; Department of Environmental Affairs, 2018b; Runhaar et al., 2018). Many cities around the world have attempted to do exactly this and have had successes as well as failures during the process (e.g. Sharma and Tomar 2010; Juhola and Westerhoff 2011; Heazle et al. 2013; Ayers et al. 2014; Rauken et al. 2015). Integrating climate responsiveness, particularly climate change adaptation, into planning instruments and processes allows early action which is more cost-effective than reactive responses (Wilson, 2006). Because local governments are at the centre of successful adaptation, much of adaptation depends on local government integrating it into local policies, plans and processes (Revi et al., 2014).

In the previous chapter, I discussed the extent to which climate change adaptation has been mainstreamed into core planning instruments in Cape Town and Thulamela. In this chapter, I continue by exploring the conditions and factors that exist behind the processes these two municipalities followed to mainstream climate change adaptation into planning, and how they can hinder and/or enable the process.

The enablers and barriers to mainstreaming climate change adaptation have been well studied and recorded locally and abroad (see Uittenbroek et al., 2013; Pasquini et al., 2013; Wamsler et al., 2014; Pasquini et al., 2015; Wamsler, 2015; Runhaar et al., 2018). It was found in similar studies that many of the identified barriers could also be interpreted as opportunities (e.g. Uittenbroek et al. 2013). In this chapter, I argue that certain barriers and enablers can be seen as two sides of the same coin and what might be a barrier in one context, can be an enabler in another. Following a qualitative approach, I study these two cases with very different contexts as well as outcomes, but a similar goal: to mainstream climate change response into planning.

3.2. Methods

A comparative case study design was used for this research. The research design as well as the case study selection process is discussed in Chapter 1. Ethical clearance was obtained for this research from the Research Ethics Committee of the University of Pretoria's Faculty of Engineering, Built Environment and Information Technology. Respondent confidentiality was maintained by not stating any names, directly linking respondents to specific departments or units, or linking any personal information to the inputs received and evidence presented in the research report. The research purpose, together with informed consent were verbally explained (Appendix 1), and informed consent forms were signed by participants where they agreed to the interview being recorded and were assured of their confidentiality.

3.2.1. Data collection

Qualitative methods of data collection such as interviews and group interviews are well suited to case study designs that aim to gather in-depth and contextual information on a case (Neuman, 2011). Because the purpose of this research is largely to understand the reality behind each of the cases, interviews and group interviews offered an opportunity to capture experiences and information better than standardised instruments such as questionnaires. In group interviews it is difficult to guarantee complete confidentiality (Silverman, 2015), however because the purpose of the interviews were focussed on information gathering and gaining insight into experiences in practice, the content discussed were not particularly sensitive and was suitable to a group interview setting.

Interviews are useful instruments to understand people, their thoughts, experiences and knowledge (Silverman, 2015). Semi-structured interviews can be one-on-one, but it is also advantages in some instances to conduct group interviews as it allows data to be collected from multiple individuals in a shorter period of time, and it is considered conducive to examining planning issues (Silverman, 2015). One challenge associated with group interviews is for the researcher to keep the discussion focussed and on-topic, and that group dynamics can add a layer of complexity to analysing the data (Silverman, 2015). Semi-structured interviews are guided by predetermined questions, but is driven by participant responses and are more conversational in nature (Silverman, 2015). The interviews in Cape Town and Thulamela were thematically structured and informed by the main objectives and sub-objectives of the study (see Appendix 2). The broad themes that guided the interviews included activities and impact of climate change adaptation mainstreaming, needs for continued mainstreaming, and reflections and suggestions on the mainstreaming process. By

having in-depth, semi-structured, one-on-one and group interviews, it was possible to gather information, as well as gain some insight into participants understanding and experience of climate change adaptation mainstreaming in practice. The structure also allowed insight into respondents' relationship with the topics being discussed, which help interpretation and discussions on the findings (Neuman, 2011). In interviews, social desirability may bias responses. Social desirability is the tendency of respondents to deny socially undesirable traits, actions or behaviours and claim socially desirable ones (Nederhof, 1985; Chung and Monroe, 2003). In this study, social desirability was addressed by aiming to reduce and prevent its incidence. The research design in itself reduced the risk of social desirability bias through the purpose of the interviews being information gathering as opposed to reporting on behaviour or choices of respondents. However, respondent might present social desirability bias towards the organisation, or local government institution, they are reporting on. This bias was to some extent addressed by the content analysis done in terms of the analytic framework in Chapter 2, which provides some verification of interview responses.

In the case of Cape Town, one group interview with four participants was held. The participants were representative of the spatial and development planning function, the environmental planning function, the infrastructure and services planning function and from the mayor's office. Permission to conduct research was provided by the City of Cape Town's Organisational Policy and Planning Department, which offers a centralised process of managing research requests within the City. Interviewees were identified based on previous work-related interactions, which allowed an established rapport with each of the participants. I requested the participation of a representative from the Resilience Office but was unable to secure their availability to participate. I travelled to Cape Town to conduct the group interview at one of the City offices. The group interview was conducted in March 2019, and took approximately 90 minutes and was guided by a schedule (Appendix 2).

In the case of Thulamela, two municipal officials were interviewed. One was representative of the spatial and development planning function, the other of the environmental planning function. Both interviewees are heads of their respective departments, and have a good understanding of technical, administrative and political activities in their departments and to some extent, of the entire municipality. The interviewees were chosen based on recommendations made from informal inquiry with persons from the Department of Environment, Forestry and Fisheries (DEFF), and South African Local Government Association (SALGA) who have had extensive interaction with the Municipality as part of the LGCCSP (see Chapter 1, Section 1.5.2). Access was only possible to two interviewees at the

time of the fieldwork, although access to more interviewees would have been ideal. However, the two interviewees were able to represent the two most relevant municipal functions, and departments in the Municipality, for this study. Permission to conduct the interviews were sought, and provided in advance from the respective Heads of Department, as there is no centralised process as in Cape Town. I travelled to Thohoyandou where the municipal offices are based to conduct one-on-one interviews. One interview took approximately 60 minutes while the other interview had to be shortened to 25 minutes due to an unplanned urgent meeting that the interviewee had to attend. The interview was guided by the schedule but condensed to focus on key questions due to time. Although the interview was so much shorter, valuable insights were still gained. Both interviews were conducted in May 2018 and were semi-structured, guided by a schedule (Appendix 2).

In Cape Town, a semi-structured group interview was appropriate since there were more participants and it was considered especially useful to have group conversations where certain topics and themes can be explored in a more dynamic way. In Thulamela because of the limited number of participants, it was considered appropriate to have in-depth, semi-structured interviews. All interviews were voice recorded and analysed using ATLAS.ti 8 software. The validity of the data is ensured by providing an as detailed and transparent as possible account of the process of inquiry, i.e. how the data was collected and analysed (see Section 1.6). The data analysis procedures are discussed below.

3.2.2. Data analysis

In this research, the phenomenon of climate change adaptation mainstreaming on the local government level was explored using an inductive approach. The evidence or data collected through interviews was used to derive concepts and themes through interpretations made from the data (Thomas, 2006; Neuman, 2011). Coding was used to organise and systematically sift through the large volume and detailed data from the interviews in the form of voice-recordings and researcher notes. Open coding involves a first pass through the data to identify concepts and themes while assigning initial codes (Neuman, 2011, pp. 354–355). Open coding was performed as a first pass through the data and was based on written researcher notes and listening to the voice recordings for the first time. During this first round of open coding, researcher notes made during the interviews were expanded on and possible links to literature identified. The purpose was mainly to become familiar with the data and to identify emerging themes and codes.

Axial coding involves a more focussed look at the emerging themes and codes identified during open coding, and identifying analytic groupings around which concepts and themes can be organised (Neuman, 2011, p. 356). Axial coding was performed as a second round of coding, to better structure the interviews and group interview data into more manageable conceptual categories (Neuman, 2011). During this second round of coding ATLAS.ti 8 software was used. ATLAS.ti 8 is a Computer-Aided Qualitative Data Analysis Software (CAQDAS) and was especially useful to organise the large amounts of voice-recorded data without having to transcribe it first, as the audio file can be coded directly in the software. The voice-recordings were imported into ATLAS.ti 8 from where they were listened to again, to identify quotes and to allocate one or more codes to each quotation. In the software, notes were made on each of the codes, and analytic memos linked to each quotation. Analytic memos are researcher memos, linking details in the data to more abstract, theoretical thinking about the evidence (Neuman, 2011). The analytic memos also recorded researcher thoughts, interpretations and reflections. In Figure 11 an excerpt from ATLAS.ti 8 is provided, illustrating how an audio file was coded.

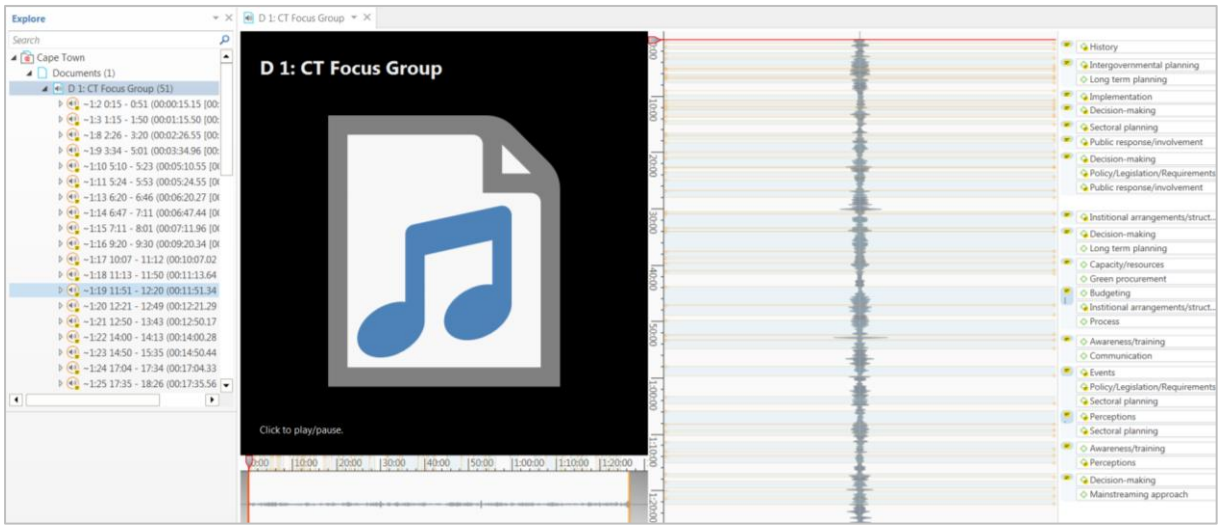

Figure 11: Excerpt from ATLAS.ti 8 showing a coded audio file during the axial coding process.

Using the ATLAS.ti 8 quotation manager tool, all quotations, codes and analytic memos for each case study was exported to MSExcel. In MSExcel all quotations were grouped per code and provided the memos captured, and the time-stamp for each quotation. Using the MSExcel output from ATLAS.ti 8, the analytic memos on each quotation were used as a basis for the discussion of the evidence, and linking the evidence to literature and theory. During the final coding process selective coding was performed where codes were further refined and grouped into six main themes that are able to reflect on the factors that either enable mainstreaming or

act as barriers to mainstreaming climate change adaptation into planning (Neuman, 2011). Important quotations were also identified that are able to support the discussion.

The questions that drove the analysis were grouped around activities and impact, and needs for continued mainstreaming. The questions were designed to gather information as to how the case has approached mainstreaming and what contributed to the hindering and/or the enabling of mainstreaming in the specific context of each case (See Appendix 2). The results are presented in the following section, starting with the six main themes that emerged from the coding process and analysis of the interview data. The results are discussed in the context of the relevant literature.

3.3. Results and discussion

The interviews conducted in Cape Town and Thulamela explored the approach that was followed in each of the cases to mainstream climate change response and adaptation into planning processes. From the data analysis process discussed above, six themes emerged. The distinct conditions of each case study are taken into consideration to reflect on unique approaches and experiences of each case regarding the six themes. In this section, the case study findings are discussed in the context of the six themes illustrated in Figure 12.

Figure 12: Themes or factors that can facilitate and/or hinder the process of mainstreaming climate change adaptation into planning.

3.3.1. Champions, leadership and momentum

The literature suggests that leadership is one of the factors that can most strongly enable or hinder mainstreaming of adaptation in planning (Anguelovski et al., 2014; Eisenack et al., 2014; Pasquini and Shearing, 2014; Pasquini et al., 2015; Chu et al., 2016). Different forms of leadership or leadership from different functions within a municipality are needed. Eisenack (2014, p. 869) argues that "leadership (regardless of position or authority) can be crucial in the early stages of adaptation". This theme explores the organisation of leadership in the municipal context to provide direction and drive the process of mainstreaming climate change adaptation within each of the cases. Reference is made to administrative as well as political leadership. Administrative leadership refers to leadership taken by appointed public administrators and professionals (e.g municipal managers, spatial planners and environmental practitioners) whereas political leadership refers to leadership taken by politically elected officials (e.g. mayors and council members) (Nkwana, 2012).

Cape Town respondents indicated that administrative leadership around climate change response in the City mainly comes from the Environmental Management Department and the Resilience Office, while political leadership came from the previous Mayor De Lille. De Lille served on a number of climate change and resilience-related committees and was involved in international partnerships. Respondents felt that even though political involvement in such committees, partnerships and networks does not necessarily change things on the ground, it provides exposure, which can also lead to funding. Currently, in Cape Town, the leadership around climate response and adaptation mainstreaming is administratively and technically rooted, given the current limited political leadership. The respondents shared that there is an impression that the City's current administrative and political leadership is not driving the idea of climate action and response enough, and that action is often dependent on a few individuals who act and take it upon themselves to do something. One respondent argued that because of the current lack of high-level administrative and political leadership from the City, there is some sense of powerlessness where individuals that are driving the process from a administrative and technical perspective, are left to feel that their efforts will not make a difference. The respondent said:

"There's nothing I can do through my work, really, that will have much impact".

During the recent Western Cape drought, respondents remarked that they felt that City management was not exhibiting enough urgency to respond. Respondents also stated that there was notable, strong interim leadership from the Water and Waste Department who put

in a lot of effort to convince political leaders to make decisions around large water projects such as the construction of desalination plants. The drought and water crisis accelerated response to climate change with leaders emerging during this time, such as from the Water and Waste Department. Respondents said that the drought created an opportunity for action where years of work came to a head. A number of policies, by-laws and infrastructure projects that were years in the making, were realised during this time. There are still some plans and strategies in the City that need updating to reflect the newer message around climate change response and adaptation, but the crisis created urgency for action and drove implementation. Anderson et al. (2018) found that even though the risk of a high-consequence climate change events can motivate planned adaptation, it is the occurrence of such events that likely lead to action. The saliency of an event, such as the drought in Cape Town and the resultant impacts, will often drive decision-making and more immediate action (Anderson et al., 2018).

In Thulamela, an individual champion is mainly driving the climate change response agenda from the Community Services Department, who was also one of the interviewees. This person has been involved in the efforts to mainstream climate change in the Municipality since it started in 2010. Respondents felt that this person has ensured that officials receive training and established a network of people in the Municipality to support the drive towards mainstreaming across most departments. Although there may be a possibility of over-reporting by the respondent on self-activity, the fact that the other respondent confirmed the role of the champion in a separate interview supports the statement. This finding aligns with other literature reporting that the presence of an institutional champion that supports adaptation at a technical and administrative level, can drive collaboration and has the ability and power to enlist support from diverse stakeholders, which is key to mainstreaming (Chu et al., 2016; Department of Environmental Affairs, 2016). Thulamela has had some administrative and political support from the municipal manager and the mayor for climate change and adaptation since as early as 2010 when it was nominated as a beneficiary of the Buyisela Eco-Town Programme, receiving funding to address waste management, biodiversity loss, water quality and management, climate change and air pollution, environmental education and awareness (Department of Environmental Affairs, 2010). Despite this political awareness and appeared support, one respondent noted that getting support from some politicians and municipal officials are not easy and is a continuous process.

The organisational and governance structures of the two cases are very different from each other, being smaller and less complicated in Thulamela than in Cape Town. Thulamela has a total workforce of 589, while Cape Town has a total workforce of 26 852 (City of Cape Town,

2018d; Municipal Demarcation Board, 2018). The difference in size and complexity of the organisations can be seen when comparing their executive organograms. Thulamela's executive level organogram is illustrated in Figure 13 and Cape Town's in Figure 14.

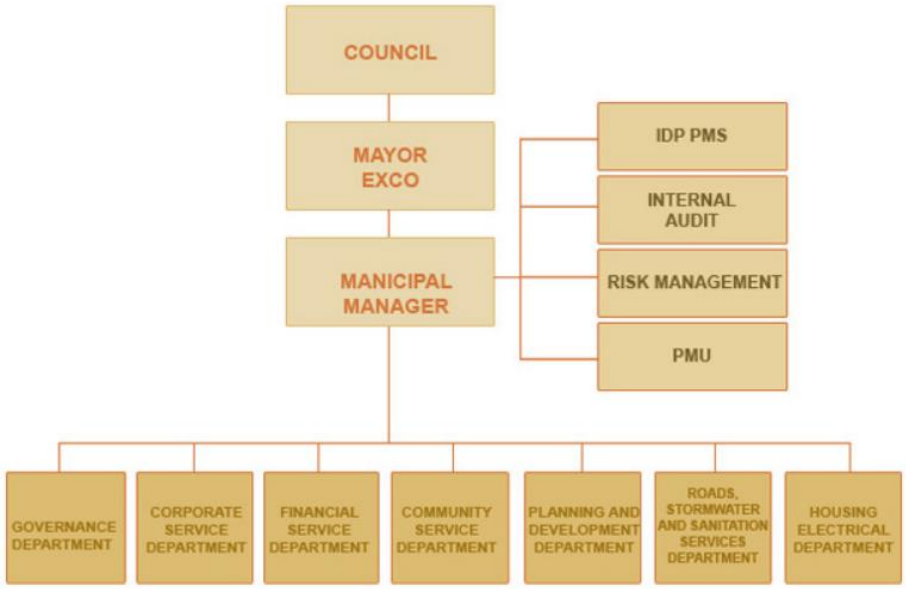

Figure 13: Thulamela Local Municipality executive level organogram (Thulamela Local Municipality, N.d).

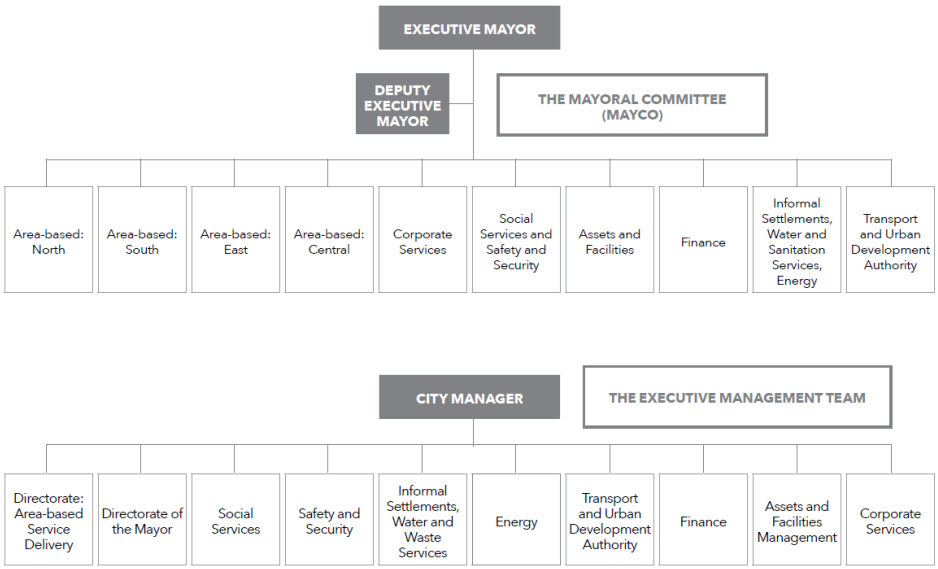

Figure 14: City of Cape Town executive level organogram (City of Cape Town, 2017a).

The observation is that the leadership arrangements that have emerged under these organisational structures are also then understandably different and appropriate to the conditions. Given the greater compactness of the organisation, it is possible in Thulamela for climate change response and adaptation to be driven by one administrative champion who is

able to gather support from a few individuals that would represent all departments across the Municipality. In Cape Town, it appears to be necessary for climate change response leadership to be more decentralised, and embedded in a number of structures and positions to be able to reach across the many directorates and departments of the Municipality. Respondents from Cape Town said that even though climate change response and adaptation policy direction is mainly provided from the Environmental Management Department, implementation sits across the City driving the cross-cutting aspects of climate change response and adaptation. These leadership arrangements appear to be working in each of their respective case-specific contexts, having their own advantages and limitations as are discussed below.

According to respondents, Thulamela has been operationally and politically stable for many years even though there are capacity and resource constraints. Respondents claim that the operational stability allows an opportunity to maintain momentum and support for climate change response and to have limited interruptions in terms of leadership. Political and administrative leadership is supported by institutional and political stability which greatly benefit a municipality's ability to make decisions and see them through (Pasquini et al., 2015). However, political leadership can change unexpectedly within and between political terms, where a change in political leadership often result in a change in administrative leadership as well (Pasquini and Shearing, 2014). Similarly, if the single champion were no longer able to fulfil this role in Thulamela, it is very likely that some, and possibly all momentum would be lost and climate change response will no longer receive the amount of attention that it is receiving at the moment, despite it appearing to have some political support. Having a single champion driving the climate change response agenda highlights the need to build capacity and raise awareness among all officials and politicians that play a role in planning and development in the Municipality. Strong and active political leadership is essential for driving major and rapid change, and strong administrative leadership can be essential for proactive change (Pasquini and Shearing, 2014; Leck and Roberts, 2015; Pasquini et al., 2015; Rauken et al., 2015; Oulahen et al., 2018). In Cape Town, respondents stated there are more regular leadership changes and restructuring in the organisation that can affect the relative position and influence of administrative and political leaders of climate change response. It is for this reason that a decentralised leadership structure is more appropriate in Cape Town and is what has supported mainstreaming across departments. The implications of such a decentralised system are that leadership roles are not necessarily clear and can result in a lack of leadership, particularly from higher-level political and administrative officials, as was presented earlier in this section.

3.3.2. Networks, mobilisation and organisation

Under this theme, the formal and informal networks and the organisation of people and partnerships in support of knowledge sharing, and mobilising resources and support for climate change adaptation across the two cases are discussed (Chu et al., 2016; Juhola and Westerhoff, 2011).

Respondents recognised that Thulamela has very limited official networks, partnerships and memberships from which support is received. Apart from support received through DEFFs LGCCSP, Thulamela is also one of the municipalities that received support through Santam's Business Adopt a Municipality (BAAM). Santam is a large short-term insurance company in South Africa. The purpose of BAAM is to support local municipalities to strengthen institutional and participatory development capacity in support of disaster risk reduction (Santam, 2014). Thulamela was one of five municipalities that were supported through this initiative. Through BAAM, Thulamela initiated a community programme to raise awareness about measures to protect individuals and the community from floods (Santam, 2014). The Santam initiative is now known as the Partnership for Risk and Resilience (P4RR). In recent years, there has been almost no P4RR activity in Thulamela. The current lack of support from external networks and partnerships limits the ability of the Municipality to learn from other's experiences and share their own. The focus on the LGCCSP is more on capacity building, and offers limited exposure, and opportunity for networking and partnerships.

Respondents mentioned that Cape Town supports and implements a number of international agreements and conventions, either as a direct signatory or through its role in supporting national commitments. As a member of the C40 Network, the City has committed to delivering on the goals of the Paris Agreement at the local level, while the network provides access to services in support of climate action like technical expertise, peer-to-peer learning opportunities, and networks for influence and advocacy (C40 Cities Climate Leadership Group, 2019). The city is also a member of the 100 Resilient Cities Network, pioneered by the Rockefeller Foundation, through which the City is provided with resources to be able to build local resilience. The network provides guidance, expert support and access to solutions, service providers, and partners to develop a Resilience Strategy (100 Resilient Cities, 2019). As a signatory of the Durban Adaptation Charter, the City committed to local climate action in their jurisdiction that will assist their communities to respond to and cope with climate change risks thereby reducing vulnerability (Durban Adaptation Charter, n.d.). Other agreements and conventions to which the City has committed to include the Carbon Disclosure Project (as a C40 Network member), the Millennium Development Goals, the Ramsar Convention, and the

United Nations Framework Convention on Climate Change (UNFCCC) (City of Cape Town, 2017a).

Cape Town respondents felt that these partnerships and conventions do not necessarily have a direct impact on the ground, but that they do offer opportunities for networking, profiling and exposure of the City and its activities and need around climate change response. This can often lead to future funding and establishing other partnerships, as one respondent said:

> *"A lot of these things often don't really change anything on the ground, but it's a networking and profile-raising kind of thing* [….]. *A lot of these big membership organisations* […] *can sometimes be very beneficial to get in touch with other partners, get access to funding, knowledge exchange*".

Respondents also mentioned that transversal working groups have been established in the City as formal structures that support top-down driven integration of certain cross-cutting issues into all other sectors and departments of the City, climate change and response being the focus of one of them. Respondents however felt that informal networks and professional relationships are more valuable to support coordination and mainstreaming. When discussing the transversal working groups, one respondent said:

> *"I do think those* [formal networks] *have an important role. Personally what I think is more important, is informal networks. Like the people in this room. If there's a project that one of us is sort of interested in or working on and need input or advice from somebody else – it doesn't go through the working group and back down the other side. It is very much like a person-to-person discussion.* […] *And I think it is much more valuable than the formal process".*

This quote offers some insight into the fact that informal networks are considered an important factor to learning and sharing among professionals to enable quicker processes and responses towards implementation, as opposed to the more tedious and time-consuming processes associated with formal networks and processes, such as the working groups. Other respondents agreed that informal networks, rather than formal structures are considered very important to climate response in the City. Respondents identified professional relationships, as well as regular communication and sharing outside of formal working groups, as key to developing a shared understanding between City officials and professionals around climate response. Respondents felt that it is often within and through these informal networks that

activities, ideas, knowledge and values around climate response are shared and developed. Literature supports this finding in that informal networks have been found to facilitate open channels of sharing and cooperation between officials and professionals from different city directorates (Chu et al., 2016; Juhola and Westerhoff, 2011).

Similarly, in Thulamela, informal networks also play an important role in furthering the support for climate change adaptation and even more so in mainstreaming it into planning. Respondents mentioned that a 'climate change team' has formed under the local climate change champion in the Municipality. Respondents said that because the Municipality is relatively small, the members of this team represent all departments and many participate in the PMU where capital and operational projects are considered. When talking about the PMU and the presence of the 'climate change team', one respondent said:

> *"All the project managers are there. The climate change team is quite a big team that covers all departments".*

The 'climate change team' can be considered an informal network since it is not an official structure within the Municipality, but because it consists largely of project managers which form part of the PMU, the 'climate change team' has some decision-making power. The presence of such a network of people, and their role in the PMU, makes it central to the adaptation mainstreaming agenda in Thulamela. One perception from the respondents was that stability in political leadership in Thulamela with "no unnecessary change of regime" has allowed for common understanding and support to be established within these existing networks, as there is limited turnover of staff. Literature supports that political and administrative stability is important for continued mainstreaming efforts (Pasquini et al., 2015; Pasquini and Shearing, 2014).

In line with literature this study found that the presence of networks can enable the generation of ideas and knowledge that is key to mainstreaming (Carmin, 2014; Chu et al., 2016). Ideas can foster change through the diffusion of knowledge from one actor to another and include best practice, standards and conventional wisdom that generate an awareness and understanding (Carmin, 2014). This research also supports that networks are seen as important ways of sharing knowledge and information, mobilising resources, and building trust and consensus, regardless of being formal or informal, internal or external to the municipality (Juhola and Westerhoff, 2011). Even though this research has found that formal as well as informal networks have a role to play, it is informal networks that have been found to hold

more value. Informal networks play an especially important role as self-organised groups that have knowledge about adaptation as well as the different power networks in local government and the municipal organisation, but break away from these structures to develop shared understandings about new ways to bring about policy change and action (Moloney and Fünfgeld, 2015). This study also supports that developing shared understandings within networks within a local government is important to enable mainstreaming, and that stability and continuity is needed to facilitate this (Pasquini and Shearing, 2014). Dense social networks offer a basis for initiating and sustaining change but need to be supported through resources such as revenue and capacity (Pasquini et al., 2015).

3.3.3. Information gathering, use and sharing

This theme explores knowledge and information regarding climate change and adaptation issues as important factors that can inform and guide action (Pasquini et al., 2015). In support of knowledge sharing, is communicating the need for adaptation to elected officials and local departments (Preston et al., 2011; Carmin, Nadkarni, et al., 2012), together with awareness-raising on the possible impacts of climate change and the cost of inaction.

A lack of information or expertise (Preston et al., 2011) or information that is not available at the right scale or in the appropriate format makes it difficult to interpret and relate to policy and plans, hindering mainstreaming (Goosen et al., 2014). Additionally, information and knowledge that does not get institutionalised to build capacity, further hinder mainstreaming (Taylor et al., 2014). Therefore it is essential for local governments to have climate change and impact information available on the scale applicable to them as well as in a format that is policy-relevant (Wamsler et al., 2014). It is recognised that evidence-based adaptation planning and policy-making, and the capacity to make use of the available evidence is crucial for the development of sound plans and ultimately, decision-making (Davoudi, 2006). In Thulamela, the spatial planning department sees value in including climate change response into planning and decision-making because of the inherent spatial consequences of climate change-related risks and hazards. This perception may be attributed to an increase in communication and awareness around climate change impacts through the LGCCSP, which has influenced the way planning is done and decisions are made in the Municipality through capacity building. Available information on high-risk areas is being used to inform decision-making around land-use applications. One respondent mentioned that the Stormwater Management Plan identifies areas at risk of flooding, and this information is taken into account when considering land-use applications. Thulamela respondents expressed a general need

for more information, but with no specific emphasis placed on this need or with elaboration on the type of information that is needed, even when prompted.

In the case of Cape Town, respondents acknowledge that even though the City has access to data to support climate change response, there is a continued need for more data as well as expertise to support evidence-based planning. In recording the lessons learnt from the Western Cape drought, Ziervogel (2019) found that City employees felt that there was not enough opportunity to draw on external expertise to support response to the drought, again highlighting the value that is seen in reaching out beyond the City itself to gain access to knowledge that may support adaptation. However, in Cape Town, respondents argued that the availability of and access to information and technology is not as big a challenge as getting the information and technology through the planning and political decision-making process towards implementation and acceptance. While Cape Town highlighted the availability of information and data as an important factor for adaptation planning and mainstreaming, it is less evident whether Thulamela attaches the same importance to such information. In identifying barriers to climate change adaptation, throughout the planning process Moser and Ekstrom (2010) found that whether, how and which information is created and how and through whom communication takes place has the potential to derail the adaptation planning process. Their findings around the important role of climate change information to support awareness raising and understanding by providing a basis for constructive engagement, is supported by the findings of this study.

Cape Town respondents mentioned that a lesson learnt by the way the City responded during the drought and communicated with residents during this time, was that when the City changed the narrative around the drought from a largely negative to a positive message of “we can make a difference if we all work together”, a similarly positive response was received from community and industry. The lesson for respondents were that framing a message correctly is key to getting the desired response from actors. An example provided by respondents was the implementation of stricter water restrictions that were hampered by public and political willingness or cooperation. There was some initial resistance from the public around water restrictions and regulations where it appeared that the perception from some of the public was that if they are paying for their water, they should be able to use it as they please. Nevertheless, despite this resistance, water-use has remained relatively low since the water restrictions were implemented during the drought, indicating some behavioural changes. Respondents perceived such behavioural changes to be due in part, to how the City changed the way in which they communicated to public. Likely, other factors could have influenced this

change in behaviour. Although there are a number of psychological and social factors, such as attitudes and beliefs, to consider when framing communication around climate change, some studies found that framing a message in gain (positive outcomes) rather than loss (negative outcomes) is more likely to result in positive behavioural change (Spence and Pidgeon, 2010; Fielding et al., 2014; Van der Linden et al., 2015).

During the Cape Town group interview, it was mentioned multiple times that there is a need to change the language when speaking about and communicating information on climate change, risk and response. Respondents made the point that climate change is not something that is still to happen but that it is already happening, and that our cities and towns are not adapted to our current climate. Climate-related hazards such as flooding, wildfires and storm surges are likely to get worse in future. One respondent said:

> *"I've been trying to change the language a little bit of how we talk about climate change versus how we talk about climate risk. The two issues there is that climate change is not something that is happening in the future, it has already been happening for* […] *since the 1990s. A lot of people have not really internalised that. Also that we're not adapted to our current climate. We have flooding, we have fires, we have big storms. We have key problems that are current problems. They are not really adapted to. So it can only get worse in the future and it is also not completely new issues we need to deal with".*

This respondent, supported by the others, argued that the idea that climate change is only a future concern, poses a challenge for initiating immediate response or behaviour change within the organisation, as well as within the city. The respondents felt that changing the language that is used to discuss climate change, risk and adaptation is a way to overcome this challenge. Additionally, respondents felt that there is limited initiative from the City administrative or political leadership to communicate a message to employees and professionals (employees and contractors) to create a shared organisational understanding around climate response and to apply principles of resilience, risk reduction, mitigation, and adaptation to all the work and projects in the City. As discussed in the previous section, a lack of shared understanding can hamper climate change adaptation mainstreaming and adaptation planning (Pasquini and Shearing, 2014).

Similar challenges with communication, but this time in relation to the general public, were raised in Thulamela. One respondent mentioned that a particular challenge for the Municipality

was to get support from the local public for certain initiatives in response to climate change. One of the respondents said:

> *Our communities are not on board. There is still a lot of awareness raising that needs to take place* […]. *So they* [communities] *need to understand these issues of climate change and how to respond.*

The respondent expressed a need for support to be able to communicate with community members and farmers, and to be able to influence individual and household behaviour to limit climate impacts and support resource efficiency and conservation. This challenge with communication may point towards a lack of involvement of traditional leaders in the planning process, which is discussed in more detail under the theme of intergovernmental coordination and mandate (Section 3.3.6). The Municipality may benefit from involving traditional leaders more in this process since "traditional leaders are very effective in mobilizing people at the grassroots level because this can ensure community buy-in and representative participation" (Bikam and Chakwizira, 2014, p. 148). It could be beneficial to the Municipality to include traditional leaders in training and awareness opportunities to be able to leverage those networks to reach local communities, especially in the rural areas and to encourage behavioural changes. Communication and information sharing about climate change, the need for response, possible implication and solutions are continuously needed throughout the adaptation planning and mainstreaming process as way to increase awareness and understanding, and to provide continuity in the process (Moser and Ekstrom, 2010).

3.3.4. Capacity, resources and skills

Capacity at the municipal level is often considered in terms of tangible and intangible resources that support and sustain government functions, including human, organisational, and social resources associated with multi-level governance that contribute to community well-being and collective problem-solving (Moser and Ekstrom, 2010; Carmin, 2014). This theme explores the local capacity such as human resources, technical skills and expertise, is available to support climate change adaptation and mainstreaming across the cases, and how it has enabled and/or hindered mainstreaming.

From Cape Town, respondents expressed the need to be able to set out project specifications that integrate resilience and adaptation into the design of projects and infrastructure. However, the necessary expertise is not always available to do that, especially in the Environmental

Management Department, which is driving a lot of the adaptation and mainstreaming initiatives. The need exists to build in-house capacity and have the necessary experts appointed, as well as to be able to access expertise on an ad-hoc basis through consultants. However, the City finds it difficult to do so and respondents argue that resources are limited to make such appointments. Moser and Ekstrom (2010) found that inadequate resources are often the first response by practitioners when asked about barriers and challenges associated with adaptation planning and mainstreaming. However, the availability of external networks have the ability to facilitate getting access to external knowledge and resources to support adaptation, as discussed earlier. Cape Town has trouble accessing external support in terms of resources and knowledge as found in this study and others (Ziervogel, 2019), despite having access to a number of these networks such as the C40 Cities Network and the 100 Resilient Cities network. The study has illustrated the value of networks to support adaptation planning and mainstreaming (see Section 3.3.2), which is also supported by literature, but it appears that Cape Town has not been able to fully realise the potential benefits of such networks. Exploring the reasons for this is beyond the scope of this study, but literature suggests that a misalignment between member needs and expectations might contribute to networks not always working for its members (Ziervogel et al., 2019).

In Thulamela, there is limited or no funding and resources available for projects dedicated to climate change response and adaptation projects. Therefore, the approach in Thulamela has been to integrate principles of resilience and climate responsive design into capital and operational projects for which funding is made available, such as for construction and maintenance of infrastructure such as roads and stormwater drainage. Respondents argued that this approach had a lot to do with changing the language around climate change and response by not labelling projects as dedicated to climate change response and adaptation projects, as such a framing could risk losing important stakeholders and decision-makers. Respondents argued that it is better to influence the design of projects to be resilient and responsive to climate change than to label projects as climate change projects. However, for this approach to be successful and to avoid maladaptation, the necessary skills and expertise are necessary. The Municipality has made some efforts to build capacity within the environmental functions of the municipality, mainly through the Community Services Department. Officials in other departments such as Development and Spatial Planning have not had much training related to climate response. Through the LGCCSP training and awareness-raising was limited to those working in largely the environmental function. One respondent felt that this left planners in the Municipality to continue to grapple with the concept of climate change response and adaptation. Where other officials within the environmental

functions have developed capacity and skills in this field for a number of years now, the Thulamela planners have only recently started to become more involved and taking part in the training. The respondent argued that if more officials and politicians are trained to understand climate change, see the need for an urgent response, and better understand their role in contributing to adaptation efforts; the easier it would be to get support to implement projects that are adaptive. There is a need to better equip planners in the Municipality to be able to integrate climate response into planning as well as decision-making. A specific need for training around adaptation planning was expressed during the interviews. A lack of relevant technical expertise and a lack of understanding of climate change science and impacts, have been identified in the literature as major barriers during the process of adaptation planning and mainstreaming (Ekstrom and Moser, 2014), and the Thulamela case confirms these findings. The relevant skills to guide the process are especially critical during the initial stages of adaptation planning (Moser and Ekstrom, 2010).

3.3.5. Institutional support and coordination

This theme reflects on the internal processes and structures that can support coordinated planning for efficient and effective climate change adaptation mainstreaming into planning instruments and processes.

One respondent provided some history and background to how Thulamela was initially introduced to climate change and response through DEFFs LGCCSP and the LRT and how it has influenced the Municipality's mainstreaming process. The Municipality received support and training through the LGCCSP since 2010 when it was first introduced. The training focussed on how to use the LRT and to be able to integrate climate change response into the IDP. Since then the Municipality has continued to use the LRT and to apply the skills and lessons learnt through the process to mainstream climate change into planning and project implementation. The Municipality is currently using the PMU as the main institutional structure to mainstream climate change and response. In Thulamela an unofficial 'climate change team' has been established that includes members from all departments, particularly project managers which also serve on the PMU. It is through the PMU that climate change response is mainly integrated into project design and ultimately implementation. In the PMU, the design of each project is reviewed and the 'climate change team' uses this platform to ensure that principles of climate change responsiveness, resilience and resource efficiency are integrated into all projects.

In addition to the PMU, Thulamela has other forums and structures to ensure planning alignment and coordination between departments, as mentioned by respondents. There is a disaster management forum that meets quarterly to discuss climate change and disaster risk challenges, and all departments take part. In addition, with the recent updating of the SDF, a committee was established with representation from all departments to make sure that all needs, challenges and opportunities are included. The SDF committee had representation from the Community Services Department, which in particular pushed for the integration of climate change and adaptation. From the interviews, there were divergent opinions on how successful they were in integrating climate change adaptation into the SDF. Considering that during the interviews the SDF was in its early stages of development, a detailed analysis of the final product showed that climate change adaptation was integrated in a relatively meaningful way (see Chapter 2). It therefore appears that the SDF committee was, at least in part, successful in its coordination to make sure climate change adaptation was integrated into the SDF.

Climate change response has been largely mainstreamed within projects through the Project and Programme Management Tool and the Strategic Management Framework in Cape Town. These tools are used to include projects in the Medium Term Revenue and Expenditure Framework or budget. Despite this, respondents stated that they had trouble finding a place for adaptation projects in the City budget. They continued by saying that while climate change response has been mainstreamed into the budget, this mainstreaming has not been optimal because cross-cutting projects are difficult to include, and these are at the heart of adaptation. It is also the respondents' experience that principles and ideas captured in the various City strategies and planning instruments are not always reflected on the ground. Respondents supported their statement by using an example of the Medium Term Infrastructure Investment Framework that did not reflect projects and initiatives that were always supportive of the principles as per the SDF and the CDS. This break between principles and actual planned and implemented projects can be linked the misalignment of budgets and timeframes between related sectors and ultimately, a breakdown in planning coordination. A specific example provided by respondents was that the City's water strategy has no budget allocations towards water-sensitive design projects because water provision and water infrastructure functions have been split and have resulted in uncoordinated planning, which includes budgeting, and consequently the implementation of projects that ultimately miss opportunities for resilience building. However, respondents also mentioned that the City has been doing some adaptation work for a number of years, specifically in the water sector, but that it has been done under the banner of "resource conservation". Another example provided was of the SDF, where

some decisions are made counter to the principles of using land efficiently and supporting densification, which has affected progress in building a spatially efficient city. As one respondent explained:

> *"A lot of decisions that were made counter to the Spatial Development Framework meant that land use has not been efficient over the years and more land has been used than we needed for the population. Given that we have a limited scope for population growth, allowing sprawl gives us less ability to actually build the kind of city we need to build for it to be resilient".*

Respondents felt that decisions are often finally made by political role-players who sometimes make decisions negating the long-term plans with specific goals and intentions. Participants continued by saying that politically-driven decisions are most often in support of short-term goals, in line with political cycles, rather than long-term visions and strategies, leading to a breakdown in planning coordination. This is a problem that is not unique to Cape Town or even South Africa, where elected officials are reluctant to make long-term decisions, perceived as difficult and unpopular in the short-term (Mukheibir et al., 2013; Forino et al., 2014; Pieterse et al., 2016; Mabon and Shih, 2018; Pieterse, 2019).

There are however examples of where coordinated planning had successful outcomes, as provided by the Cape Town respondents. Coordination between the coastal management branch, the disaster risk management unit and the spatial planning branch in the City, has led to the inclusion of the coastal urban edge, the wildland-urban-interface, and firebreak areas in the SDF. Including these elements in the SDF allows for better coordination between different branches in the city to guide development away from areas such as vulnerable coasts and areas exposed to fire risk. This example of coordinated planning ensured that climate risk was included as an important factor in spatial planning and decision-making in the City. Respondents argued that it is challenging to enforce some principles such as preventing development and settlement in high-risk areas. Informal settlements emerge in high-risk areas such as floodplains over short periods and preventing or managing the phenomenon is particularly challenging. One approach that the City follows is to take a hard line and refuse to provide services such as electricity in such cases, under the principle that such a settlement is a public risk issue. This approach taken by the City illustrates how different sectors or departments such utilities, informal settlement, disaster risk management and development planning are coordinated in their efforts to reduce exposure to certain risks.

The South African local governance structure is complex and made up of many actors with competing priorities and agendas, and multiple policies and reporting requirements which further complicate the planning system (Koma, 2010; Measham et al., 2011; Koelble and Siddle, 2014; National Treasury, 2017). In Cape Town respondents remarked that the process to get a project, programme or initiative off the ground can be discouraging. The regulatory environment is very difficult to navigate, and there are multiple processes that are very time-intensive. One respondent elaborated by saying:

> *"And unfortunately, climate resilience, responsiveness etcetera* […] *are processes that take time, but also requires flexibility and innovation. And this very stringent regulatory environment doesn't really permit that easily. It's possible, it's not impossible to do. It's just that much more difficult".*

Internal programmatic incentives and benefits that support adaptation planning (Chu et al., 2016), such as legislative requirements and obligations are considered important enablers of climate change response action and mainstreaming (Department of Environmental Affairs, 2016). However, in the case of both Cape Town and Thulamela, these are not in place and therefore adaptation needs to be mainstreamed using existing policy frameworks that are not necessarily enabling of climate change response action and mainstreaming. These frameworks and governance structures are seemingly less complicated in the case of Thulamela than in Cape Town, resulting in different experiences with mainstreaming, as discussed earlier.

3.3.6. Intergovernmental coordination and mandate

Under this theme, the intergovernmental relations and coordination processes and structures in place to facilitate planning across spheres and scales, and overcoming possible limitations in terms of the mandate from the two cases are discussed.

Thulamela is not a water service authority since the Vhembe District Municipality hold the mandate over water services provision and reticulation within Thulamela. Respondents argued that the Municipality experiences challenges where the District will design and approve projects that are not necessarily adaptive to climate change or contribute to resilience. One respondent argued that although Thulamela advises the District on planned projects within the jurisdictional boundaries of the local municipality, their recommendations are not always taken up. Because of these restrictions in the mandate of the Municipality, one respondent felt that

they are unable to make “meaningful contributions” toward adaptation in the water sector. Thulamela participated in the drafting of the Vhembe District Climate Change Response Plan that was facilitated through the LGCCSP, but since then their involvement in District level planning has been limited. One respondent explained that after the completion of the Vhembe District Climate Change Response Plan, Thulamela started to implement smaller quick-win projects such as replacing some public water taps with stop-taps to reduce water waste. Respondents argued that the Municipality wants to do larger projects that address vulnerabilities specific to the municipality but because of a limited mandate, capacity and resources, are finding it difficult to do. Literature has found that intergovernmental coordination challenges are common within local government (Forino et al., 2014; Juhola and Westerhoff, 2011; Mukheibir et al., 2013; Neil Adger et al., 2005; Oulahen et al., 2018).

This study has found that in the case of Thulamela, where the power inequalities between the Municipality and the District, together with their own internal capacity constraints, have an impact on Thulamela’s ability to effectively mainstream across sectors and levels of government. It is possible that Thulamela’s mandate or influence over land, in terms of land-use and spatial planning, could also be limited due to the extent of land under traditional authority rule. More than 60% of settled areas within the Municipality are considered traditional settlements (Le Roux, Van Niekerk, et al., 2019) and close to 90% of the total land area is under the rule of traditional authorities (Thulamela Local Municipality, 2019). However, no concerns related to traditional authorities were raised during interviews, and therefore it is not possible at present to know how traditional authority rule may or may not limit the influence of the municipality over land-use and spatial planning. However, other research on the role of traditional leaders in the Municipality and the Vhembe District has found that the relationship between municipal officials and traditional leaders is strained. Literature shows that traditional leaders feel excluded from the planning process; and the that there is generally very little clarity about the role of traditional leaders in the planning process (Brynard and Musitha, 2011; Nekhavhambe, 2014; Bikam and Chakwizira, 2014).

Even though the Municipality participates in a number of intergovernmental planning forums on district and provincial level, respondents did not consider these very important or worthwhile forums for advancing and supporting climate change adaptation and mainstreaming. The reason for this is that there is a reported perception among respondents that there are issues with intergovernmental planning and coordination to integrate climate change adaptation, but that the issues mainly sit outside the Municipality because, through the LRT, climate response has been successfully integrated into the IDP. Given the limited

powers and functions of Thulamela and the impression of poor intergovernmental arrangements and relationships, as discussed earlier, it is unsurprising that respondents perceive intergovernmental planning forums as ineffective to them. Although respondents did not clarify what these issues are exactly, one respondent argued:

> *"Because the Municipality has already adopted the* [LRT] *toolkit, it is not a challenge within the municipality, but it is outside the municipality where we are trying to rope in* [the] *district and these other municipalities as well".*

A detailed analysis of the IDP to determine the extent to which climate change adaptation was integrated showed that the Municipality was largely unsuccessful in their attempt (see Chapter 2). The variation between what respondents are reporting on the IDP, and what results emerged from the document analysis, might indicate that there is a perception within the Municipality that simply the act of using the LRT to guide the integration of climate change into the IDP will lead to a successful outcome. Another study also found that the LRT is insufficient when used on its own to guide and drive mainstreaming (Santhia et al., 2018).

Limited mandate over the planning for and the provision of services such as water can severely limit the influence of a local municipality to respond and adapt to climate change. The opportunities for adaptation in the water sector are great, and when a local municipality with the will to adapt, are not able to because of limited mandates, the impact is diminished, such as seen in Thulamela (Shah, 2009; Ludwig et al., 2012; Azhoni et al., 2017). In line with literature, this study has found that where municipalities have limited mandate, it is important that intergovernmental relations and planning coordination are well in place and able to facilitate the inclusion of local municipal adaptation and response agendas into areas where they do not necessarily have service delivery mandate (Koelble and Siddle, 2014). This study has also shown that to facilitate intergovernmental relationships and planning coordination, it is necessary for the province, district and local municipality to have a shared understanding and vision regarding climate change response and adaptation in their shared geographic area. Similar to other research, it also emerged from this study that when dealing with long-term impacts, which often have high levels of uncertainty, it is especially difficult to get support in decision-making and planning processes in a multi-stakeholder and multi-sphere setting (Goosen et al., 2014).

Cape Town has mandate over all basic municipal services as part of its constitutionally mandated functions, either through itself or through municipal entities or substructures

(Western Cape Government, 2019). Respondents in Cape Town considered coordination between the Western Cape Province and the City of Cape Town very important, particularly concerning long-term planning in response to the 2005 and then the more recent (2014 -2017) Western Cape drought. Many of the regional initiatives required to address drought and water scarcity are within the mandate of the Province rather than the City, as per Schedule 4 and 5 of the Constitution (Republic of South Africa, 1996). It is very important that initiatives related to dams, water transfers and augmentation are developed and implemented in a coordinated manner between the City and the Province. Respondents said that a good relationship, particularly around managing drought, was established in 2005 with the previous drought in the Western Cape. The relationship that was established then, was perceived to be key to coordination and alignment between the Province and the City during the latest, and very severe, drought. The National Department of Water and Sanitation also played an important role and facilitated inter-basin water transfers during the drought, although it was found that they sometimes failed in their leadership and duty to support the City and the Province in other instances related to the drought (Ziervogel, 2019).

In the Cape Town case, good intergovernmental relationships and coordination have proved valuable in overcoming issues of mandate and adapting on a regional scale. This was also likely facilitated by the fact that the City and the Province share a similar view on climate change adaptation and both consider it integral to responding to the impacts of climate change (City of Cape Town, 2017b; Western Cape Government, 2014). In Thulamela, intergovernmental coordination and relations are experienced very differently. The Limpopo Province has not taken a particularly strong position on climate change response and only drafted their first provincial climate change response plan in 2016 (Limpopo Provincial Government, 2016), where the Western Cape has already had a response plan in place since 2008 (Western Cape Government, 2008). In the Western Cape, there are strong drives for climate change response and adaptation from the Province and from the City. In Thulamela, the drive is less from the Province and more from the Municipality, but it appears that Thulamela has limited agency and power in its current intergovernmental structures.

3.4. Conclusion

Even though the institutional or organisational conditions and local context differ significantly between Cape Town and Thulamela, six common themes emerged when reflecting on enabling and hindering factors for mainstreaming climate change adaptation into planning processes. These were champions, leadership and momentum; networks mobilisation and

organisation; information gathering, use and sharing; capacity, resources and skills; institutional support and coordination; and intergovernmental coordination and mandate. Divergent findings emerged in the two cases for each of the six factors, which indicates the significance of context, but there were also areas of similarity.

From both Cape Town and Thulamela, there was limited leadership and communication from the administrative and political leadership (as discussed in Section 3.3.1). This gap limits the ability of the organisation to develop a strong, shared value-position on climate change adaptation. High-level political leadership appears to be important in addition to administrative leadership that is based within departments or directorates. One of the key roles of high-level political and administrative leadership would be to build an organisational culture in support of climate change adaptation and mainstreaming (Pasquini and Shearing, 2014). Building such an organisational culture would possibly relieve concerns, such as what was experienced in Cape Town, where individuals feel alone and discouraged in their attempts to act in response to climate change. The value of informal networks to support the development of such a shared understanding was also illustrated from both cases (as discussed in Section 3.3.2).

Both cases showed that there was relatively good integrated planning between departments within the organisations (as discussed in Section 3.3.2) which can be considered an important factor for enabling mainstreaming which is dependent on good relations and cross-sectoral or multi-disciplinary planning (Moloney and Fünfgeld, 2015). In both Cape Town and Thulamela, there are examples of how coordinated planning between departments resulted in climate change, risk and adaptation informing their spatial planning. Mainstreaming in metropolitan municipalities is often hampered by sector-based planning where development and environmental planning often operate separately due to the size and complexity of the organisation, whereas in smaller municipalities mainstreaming is hindered by a lack of capacity, technical expertise and financial resources (Sowman and Brown, 2006). Ultimately, Cape Town was to some extent able to overcome its self-proclaimed complex and tedious planning processes and regulatory environments. From the evidence, it appears that the presence of networks as well as the transversal management systems in place in the City, has enabled Cape Town to start to break down some of the barriers to climate change adaptation mainstreaming. In the case of Thulamela, there are general capacity and resource constraints in the Municipality, with a single person often fulfilling multiple roles cutting across multiple departments. The evidence suggest that having such a well-placed individual and climate change champion, fulfilling many roles across Municipality, could have supported climate change adaptation mainstreaming within Thulamela.

In this chapter, I explored the conditions and factors that exist behind the approaches Cape Town and Thulamela followed to mainstream climate change adaptation into planning, and how they have hindered and/or enabled the process. The study has illustrated the importance and relevance of context in mainstreaming, as well as how certain arrangements would work in one municipality and not in another, maintaining that enabling and hindering factors are often two sides of the same coin. In the next chapter, I draw conclusions from the results of the analysis of the extent to which climate change adaptation was mainstreamed in the core planning instruments of Cape Town and Thulamela, and the findings from this chapter where I considered mainstreaming through the lens of experiences and accounts by local officials. Drawing from these findings, I make recommendations relevant to local municipalities in South Africa on how to support more efficient and effective mainstreaming of climate change adaptation into planning.

CHAPTER 4:
SYNTHESIS AND RECOMMENDATIONS

4.1. Introduction

In this chapter a synthesis of the findings from the study is provided, and based on the findings, recommendations are made that are intended to support more proactive and effective mainstreaming of climate change adaptation into local government planning. The recommendations are provided in support of the third objective of this study.

4.2. Synthesis of findings

In terms of the content analysis, it was found that climate change response and mainstreaming were well integrated into the first steps of the planning process, but with limited mainstreaming in the final steps of the planning process. In both Cape Town and Thulamela, the planning instruments address climate change adaptation to some extent, usually more in terms of strategy rather than implementation, monitoring, and evaluation. The sections that were the least responsive across all the plans considered were those relating to institutional arrangements and M&E. Preston et al. (2011) argue that there is no agreed, systematic approach to M&E for climate change adaptation, nor the capacity to undertake M&E, and this study found the same. Additionally, a lack of indicators, relevant data and expertise can undermine M&E (Moser and Ekstrom, 2010). The impression of weak institutional arrangements and M&E was particularly apparent in the case of Cape Town where climate responsiveness, resilience and resource efficiency came across strongly in the overall strategy and informed the guiding principles and actions of all three the instruments assessed. However, the plans fell short when these principles and strategies needed to be actioned through institutional arrangements and implementation tracked through M&E. This issue is not unique as it is well known that government planning, across all spheres, have difficulty in interpreting long-term visions into local action through long-term programmatic, and coherent planning (Pieterse et al., 2016; Pieterse, 2019) and that it is easier to track activity rather than impact, particularly when measuring resilience (Tyler et al., 2016).

Thulamela's IDP did not sufficiently consider climate change response and resilience in its guiding principles and strategies or articulated the desired climate change response goals and outcomes, and it is unsurprising that it also did not meet subsequent assessment criteria or

only met the criteria in part. The objectives appear disjointed from the development strategies and suggest that the integration of climate response is occurring in an uncoordinated and non-strategic way. Having a clear and well-articulated vision and strategic principles, supported through goals, outcomes and strategies provide a foundation and framework for subsequent steps in the planning process (see Figure 4, Chapter 2). Where there are weaknesses in the planning process, the subsequent steps will reflect those weaknesses. Therefore, when there are weaknesses in the visioning and strategic principles, these weaknesses are reflected in every step in the processes thereafter, as was the case in Thulamela's IDP. Its SDF was far more successful in this regard, where the vision and strategic principles were more clearly articulated.

When comparing the overall extent of mainstreaming of climate change adaptation in planning instruments between Cape Town and Thulamela, the importance of access to information and data on risk and vulnerability, climate change, and its impacts, emerged clearly. The importance of information surfaced in the way it was highlighted as an important factor in Cape Town, and how it emerged as a gap in Thulamela. In addition to having the necessary data and information available at the right spatial and temporal scale, analytical skills and capacity are also needed to be able to interpret and use the information effectively, and to ultimately develop clear, context-specific adaptation responses (Taylor et al., 2014; Ziervogel et al., 2014). Interestingly, a lack of information and knowledge, although acknowledged, was not highlighted as an important barrier to mainstreaming adaptation from the interviews in Thulamela. However, in Cape Town, it was considered a challenge even though the City has far better access to information through a number of networks (see Section 3.3.2 and 3.3.4). Why would Thulamela, where there is a greater lack of data, information and knowledge not emphasise this lack as a concern when it is raised as a concern in Cape Town, where there is considerably better access to data, information and knowledge? The fact that Thulamela did not emphasise the importance or the value of an evidence-base to inform their planning during interviews, although there being an evident gap of an appropriate evidence-base in their planning instruments, may suggest that the Municipality has not experienced or realised the potential value that information at the right spatial and temporal scale can have for their municipal planning or adaptation planning.

In Thulamela, there is some evidence that knowledge of climate change adaptation and practical ways of adapting to climate change have been included in the SDF. Because the SDF was developed by consultants, there is little guarantee that this knowledge will be institutionalised and internalised by officials, particularly those that sit on the PMU and drive

the mainstreaming of climate change response and adaptation on a project design level. Cape Town takes ownership of most of their spatial and development plans, developing them in-house. During the analysis of Cape Town's key planning instruments (see Chapter 2), it was noticeable that the plans were of high quality and that there was strategic alignment between the plans. In Thulamela, the IDP is developed in-house and climate change response and adaptation can hardly be considered mainstreamed into it, as demonstrated in Section 2.5, and it was generally not well-structured or coherent. The SDF was outsourced and is generally more coherent and logically structured, and adaptation mainstreaming was far more successful than in the IDP (see Section 2.5). Similarly, the Disaster Risk Assessment was also outsourced, and there is no evidence that it has been used to inform either the IDP or the SDF, as discussed in Section 2.5.2. The fact that the Disaster Risk Assessment appears to have not informed the IDP or the SDF, leads to the impression that there is a risk of losing the information and knowledge generated through the development of documents, plans and strategies when they are outsourced, as opposed to developing plans and strategies in-house. Rognes and Richtnér (2013) suggest that successful knowledge transfer is key to outsourcing knowledge generation, where outsourced knowledge generation in the case of Thulamela would be the development local government plans and strategies by external consultants. They continue by saying that explicit and tacit knowledge are mutually supportive and both need to be transferred from the outsourced knowledge generator (external consultant) to the end-user (municipality). However, tacit knowledge is much harder to transfer. Explicit knowledge can be defined, measured and recorded, while tacit knowledge is difficult to articulate and is rooted within experiences and action in a specific context (Beyah and Gallivan, 2001; Rognes and Richtnér, 2013). In their research, Rognes and Richtnér (2013) found that through service outsourcing, there is an increased emphasis on explicit knowledge which often leads to a loss of tacit knowledge. Evidence from the Thulamela case study supports this finding in that it appears that there are greater gaps in tacit, than there are in explicit knowledge.

Through the LRT awareness was raised and capacity built within Thulamela to be able to consider and integrate climate change and adaptation into planning in general and not just the IDP, but capacity and knowledge gaps still remain as discussed in Section 3.3.4. However, planning behaviour and approaches have been influenced to inherently consider climate change impacts and response, and to integrate them into planning and implementation. Ultimately, the approach in Thulamela had been to change the language around climate change and response and to influence the design of projects to be resilient and responsive to climate change, rather than labelling projects with 'climate change'. Similarly, Cape Town

respondents raised the value of not labelling projects as ‘climate change projects’ and identified it as an important step to successful mainstreaming. Even though climate change and adaptation is driven from the Environmental Management Department in Cape Town, respondents from the City confirmed that it is addressed across sectoral departments in their plans and in their planning processes. From the interviews in Thulamela it is clear that climate change and adaptation is addressed across departments in their planning and decision-making, but this is not entirely reflected in their SDF, and even less so in the IDP. Other studies looking at mainstreaming at local government level, locally and internationally, have found that only considering climate change in terms of environmental planning is a major barrier to mainstreaming (Pasquini et al., 2013; Picketts et al., 2014; Taylor et al., 2014; Pasquini et al., 2015; Spires, 2015; Santhia et al., 2018). Some of these studies looked at mainstreaming within Cape Town and identified considering climate change in terms of environmental planning only, as a barrier within the City (Pasquini et al., 2013, 2015). Since these studies have been conducted, it appears that Cape Town has made some progress in overcoming this particular barrier to mainstreaming. The City developed both a new IDP and SDF where climate change and adaptation featured strongly, and this study shows that the City no longer considers climate change as only an environmental planning issue.

The findings were very context-dependent because of how varied the processes and experiences related to mainstreaming were between the cases. There were different forms of networking that were used, having different outcomes, rather similarly to the different leadership arrangements in the cases having different outcomes. The institutional arrangements are much more complex in Cape Town than in Thulamela, and the networks and leadership arrangements that developed were appropriate in each case. Thulamela’s small institutional size and resultant simpler arrangements is in itself an enabler for mainstreaming, but it is also the reason for limited resources and capacity. Whereas in the case of Cape Town, the large and complex institutional arrangements are a barrier that the City was able to overcome to an extent. The relative agency and power that Cape Town has in the province, and the better intergovernmental relations that exist, appear to support intergovernmental coordination in support of climate change adaptation and mainstreaming. The opposite is true in Thulamela. Thulamela has limited capacity, powers and function that appear to diminish their agency in terms of the intergovernmental structures they exist and partake in. The ability of a local government to participate meaningfully in intergovernmental planning emerged from the cases as an important enabler for mainstreaming climate change adaptation on the local level.

The findings from the case studies are compared to one another within each of the themes that were identified from the analysis in Chapter 3. The summary comparison is provided in Table 4 below, indicating findings related to enabling and hindering factors in the mainstreaming process.

Table 4: Comparison of summary findings by theme where a closed lock indicates hindering factors to mainstreaming and an open lock indicates enabling factors to mainstreaming.

City of Cape Town	Thulamela Local Municipality
Champions, leadership and momentum	
Administrative and technically driven leadership from multiple departments.	Administrative and technically driven leadership from an individual champion.
Limited political leadership.	Limited political leadership.
Networks, mobilisation and organisation	
Extensive formal networks and partnerships that can support mainstreaming.	Some degree of formal networks and partnerships offering support for mainstreaming.
Existence of informal networks	Existence of informal networks
Information gathering, use and sharing	
Sufficient information and data are available to support response and long-term planning.	Very limited information and data are available to support response and long-term planning.
Limited organisational communication and value-building.	Limited organisational communication and value-building.
Difficulty in communicating with the public.	Difficulty in communicating with the public.
Capacity, resources and skills	
Sufficient technical capacity, but there is a need for highly specialised skills from time-to-time.	Limited technical capacity with the need to increase capacity related to adaptation planning.
Relatively limited skills and financial resources.	Limited skills and financial resources.
Institutional support and coordination	
Limited dependence on support from the national government to support mainstreaming.	Significant support from national government received with continued dependence to support mainstreaming.
Good inter-departmental coordination and planning.	Good inter-departmental coordination and planning.
Tedious processes limiting the flexibility needed for large cross-cutting adaptation projects.	Limited mandate, capacity and resources not allowing the implementation of large adaptation projects.
Complex internal governance systems and structures.	Simpler internal governance systems and structures.
Governmental mandate, relations and coordination	
Sufficient mandate over planning and services provision.	No mandate over water services provision and planning.
Good intergovernmental relations and planning coordination.	Strained intergovernmental relations and limited involvement in intergovernmental planning.

4.3. Recommendations

Based on the findings of this study, I am able to make some recommendations on what local government can do that will be able to support the effective mainstreaming of climate change adaptation into planning instruments and processes. These recommendations are not stand-alone, but are interrelated and should ideally be considered together to be able to enable effective mainstreaming and ultimately resilience-building. The recommendations are discussed in more detail below.

4.3.1. Change the way climate change and climate change adaptation is framed and communicated

High-level administrative and political support for adaptation and mainstreaming can facilitate getting adaptation off the ground as well as ensuring consistency in mainstreaming (Pasquini et al., 2015; Rauken et al., 2015). It is clear that for mainstreaming to be successfully done throughout the municipality, there needs to be clear communication that reflects a shared organisational understanding on adaptation and resilience building, as supported by the experiences of Cape Town and Thulamela. This communication should come from a strategic leadership position and be able to influence the organisational culture and change perceptions around climate change adaptation. Additionally, the importance and value of awareness-raising among municipal officials, politicians and city managers should not be underestimated. This is particularly true when awareness-raising makes clear the possible impacts climate change can have on local government functions such as service delivery, infrastructure provision, and social development, and then the importance of response such as disaster risk reduction and adaptation to limit these impacts.

In both Cape Town and Thulamela, respondents indicated the importance of message framing and the value that it has had in both cases where they chose not to label projects and initiatives under the banner of “climate change”. The importance of message framing was underlined by the wish of respondents to change perceptions around climate change and adaptation and to ensure more buy-in and support from officials, managers and politicians, and even from the public. In Thulamela, it was a difficult experience to convince some officials and politicians to consider the importance of climate change and responding to it, as indicated by respondents. The concept remains relatively new to many in the Municipality, and it is for this reason that Thulamela has approached mainstreaming climate change response by not labelling projects or initiatives as “climate change projects”, but rather using existing structures and processes such as the PMU where unofficial climate change champions push to have principles of

resilience and resource efficiency integrated into the design of projects. In the case of Cape Town, the water sector specifically have been adapting for many years under the banner of "resource conservation". Cape Town respondents argued that non-deliberate or even instinctive mainstreaming of adaptation could happen when climate response and adaptation has reached a certain level of mainstreaming into all planning processes, and when a shared understanding exists. Ultimately, municipal officials, managers, and project managers need to think differently about planning and project design. From this research, it became clear that one way to mainstream climate change adaptation into planning is to build the principles into the planning and design of cities and towns. Not necessarily to use the label of climate change adaptation, but to make it integral to developmental projects and initiatives. There needs to be sufficient motivation or even pressure for people to think outside the box and beyond the traditional ways of addressing issues, especially in terms of engineering, services and infrastructure. For this to happen there needs to be sufficient communication and awareness-raising around climate change adaptation and the value of mainstreaming.

4.3.2. Develop a shared understanding and evidence-base to inform adaptation planning

One of the main findings from this research was that access to information is key, as well as establishing a solid evidence-base to inform decision-making and planning for climate change adaptation. Information or data needs to be available in a form that is relevant to planning, at the right spatial and temporal scale and offering sufficient detail, and it needs to be reliable. In addition to having the relevant information and data, is the ability to interpret and use the data effectively. Information is not just important for making informed planning and development decisions, but also to form the foundation of a shared understanding of the possible impacts of climate change in an area, the need for response and adaptation, and what adaptation can or should look like (Tyler et al., 2016). A culture of sharing and learning needs to exist, particularly in multi-disciplinary teams, to be able to embed knowledge across disciplines, sectors and departments (Juhola and Westerhoff, 2011; Moloney and Fünfgeld, 2015). The fostering of a culture of sharing and learning can be enabled through the first recommendation discussed above. To effectively plan for adaptation, the problem needs to be clearly understood. Therefore, it is essential for local governments to have climate change, climate change impact, risk, and vulnerability information available on the scale relevant to them as well as in a format that is relevant to both policies and plans.

In a study by Tyler et al. (2016) the methodology to be used to define, measure and interpret indicators of urban resilience was explored through eight cities in the Asian Cities Climate Change Resilience Network. The study was based on the notion that because urban resilience indicators are context-dependent, it is essential to engage users in defining, measuring and interpreting indicators at the local level. The study found that what is even more important than developing appropriate indicators for urban resilience, is the process of developing a shared understanding among users and actors on local urban resilience, its practical implications and key related issues (Tyler et al., 2016, p. 424). The relevance of this study, in addition to illustrating the value of co-learning, is that it implies that the development of resilience indicators, or even climate-related information, should remain within the hands of local government, as opposed to higher levels of government, as they understand their own contexts and drive their own development. Networks and relationships are important enablers of developing and sharing knowledge and information, mobilising resources, and building trust and consensus. Both Cape Town and Thulamela showed that networks, formal or informal, internal or external to the organisation, provide ways to develop and share knowledge, and generate a shared understanding among members of the network or within the organisation. The establishment of such networks is enabled when a shared understanding exists, as well as the other way around where developing a shared understanding is enabled through networks and relationships.

Sources of information and evidence on climate change can be used to support the development knowledge and shared understandings. One such example is the *Green Book: Adapting South African Settlements to the Impacts of Climate Change* (Green Book) that was developed by the Council for Scientific and Industrial Research (CSIR) as an open-access online planning support tool (Van Niekerk, Le Roux, et al., 2019). The Green Book offers scientific evidence on climate change, its impacts, vulnerability, and population change. Evidence is presented through interactive Risk Profiles and an Adaptation Actions Tool. The Green Book provides all local municipalities in South Africa with access to comparable scientific information that will be able to support long-term planning in response to major changes related to demography and climate change. Tools and resources such as this can provide reliable information that can also be leveraged to form a shared understanding within an organisation, and among officials and professionals. It can also allow local governments, even those with limited capacity and resources, to develop an understanding of the impacts of climate change on their municipality, services and key resources, and enable them to integrate the information into their planning instruments and processes. It can also support capacity and skills development, to be ultimately able to develop plans and policies in-house.

4.3.3. Support capacity and skills development in climate change response and adaptation planning

Planning for climate change adaptation is identified as one of a number of contemporary 'wicked' problems that planners need to be able to address. It is considered an especially challenging problem that urban planners are faced with because it is marked by "ambiguous problem definition, scientific uncertainties, and multi-dimensional solutions in which planners have a part to play in consort with other professions" (Davidson and Lyth, 2012, p. 64). To be able to effectively plan for climate change adaptation, planners need to be better equipped with the necessary skills and technical knowledge. Planners need to have basic knowledge of climate change science, the skills to be able to understand complexity and uncertainty, and an understanding of systems thinking and futures thinking (Davidson and Lyth, 2012). In Thulamela limited skills and capacity exists, and even Cape Town recognised that expertise in climate change adaptation could be expanded. It has also been argued that for mainstreaming to be successful, the appropriate skills and expertise needs to exist to be able to interpret climate risk and vulnerability information and to relate it to adaptation planning initiatives and projects (Goosen et al., 2014; Kunapo et al., 2018).

Networks are important mechanisms for generating and sharing ideas and knowledge, as well as fostering a shared value-system across an organisation, as mentioned earlier. The significance of networks has been illustrated in both cases. Some of the key role players and initiatives that play instrumental roles in supporting professionals involved in municipal planning and climate change adaptation with capacity, information sharing, awareness-raising, and networking, are the institutions of higher learning, research and professional associations. The South African Planning Institute (SAPI), the South African Council for Planners (SACPLAN), the African Association for Planning Schools (AAPS), and various planning schools offering post-graduate and continued professional development and guidelines, all play a critical role in supporting those who will contribute to the planning and building of resilient towns and cities (Watson and Agbola, 2013). The AAPS network identified climate change as one of five conceptual entry-points to develop a more context-appropriate planning education in Africa, together with informality, land access, actor collaboration and the relationship between spatial planning and infrastructure (Watson and Odendaal, 2013, p. 6). These conceptual entry points or themes were identified as integral to all aspects of planning in Africa. Very little research exists around planning education and climate change. Climate change is acknowledged as an important aspect that needs to form part of the planning pedagogy (Davidson and Lyth, 2012; Mitchell and Graham, 2017; Watson and Agbola, 2013), but an assessment of the extent to which it is actually included does not exist, at least not for

Africa or South Africa. Networks such as the Municipal Institute of Learning (MILE), SALGA and even DEFF's LGCCSP are also key to developing skills related to adaptation planning and sharing experiences and knowledge between members. It is through networks such as these mentioned here that relate to local government specifically, and networks aimed at planning professionals, that knowledge and experience can be shared to ultimately build better capacity and access to information within local government to practice adaptation planning and mainstreaming.

CHAPTER 5:
CONCLUSION

5.1. Implications of findings

Local government needs to deal with the compounded effects of developmental challenges and climate change, often without sufficient mandate, resources, support, or guidance. Adaptation planning and climate change adaptation mainstreaming are recognised as ways to deal with these challenges, but how to go about adaptation planning and mainstreaming, what would hinder it, and what would enable it, is not well understood. This study undertook to explore how climate change response, with a specific focus on adaptation, can be mainstreamed into South African municipal planning functions by describing two different cases, namely the City of Cape Town and Thulamela Local Municipality, where climate change responsiveness and mainstreaming into municipal planning functions have been undertaken. The objectives were:

1. To determine the extent to which climate change response is currently mainstreamed in relevant municipal planning instruments, namely Integrated Development Plans (IDP), Spatial Development Frameworks (SDF), and Built Environment Performance Plans (BEPP) in the case of metropolitan municipalities;
2. To explore the factors that hindered and/or enabled the process of mainstreaming climate change response and adaptation into municipal planning; and
3. To identify ways for more proactive and effective mainstreaming of climate change adaptation into municipal planning.

To explore these objectives, the study made use of a comparative case study design, using atypical cases that were able to offer the most information and insight on a phenomenon such as mainstreaming and that were able to demonstrate certain overarching principles that help illustrate patterns that could be common among other cases. The study was framed within critical pragmatism, as underlined by pragmatism and critical theory, in that it looked at real-world situations, and sought to identify interventions that consider context-specific complexity and are relevant to practice. The study followed a qualitative research design, using largely inductive reasoning.

The extent to which climate change adaptation is mainstreamed into key planning instruments was assessed through a qualitative content analysis guided by an analytic framework based

on the planning process. Being focussed on the important role of planning in climate change adaptation mainstreaming, the analytic framework was developed in terms of the typical planning process and how mainstreaming should occur in this process, as reflected in key planning instruments such as IDPs, SDFs, and the BEPP. By making use of one-on-one and group interviews, the factors that have hindered and/or enabled mainstreaming were explored. Six themes emerged on enabling and hindering factors within the cases, and these factors' similar as well as different experiences within each of these themes were captured.

In the planning process, the area where the cases had the least success in mainstreaming was that of implementation planning and M&E. It was also found that when mainstreaming is weak in the initial steps of the planning process, this weakness is likely to reflect throughout the subsequent steps, particularly in the last step of implementation planning and M&E. Through this study it was found that knowledge, information and technical skills to support adaptation planning in municipalities are key to mainstreaming, as are developing a shared understanding of the challenges that needs to be addressed and how they can be addressed. The findings also showed that it is key to develop mainstreaming approaches that are context-specific and that build on institutional strengths while taking cognisance of challenges.

Based on the findings of this study, some recommendations were made on what local government can do to improve the effective mainstreaming of climate change adaptation into municipal planning instruments and processes. The recommendations are not stand-alone, but are interrelated and should ideally be considered together to be able to enable more effective mainstreaming and ultimately resilience-building. The recommendations included the following:

1. Change the way climate change and climate change adaptation is framed and communicated.
2. Develop a shared understanding and evidence-base to inform adaptation planning.
3. Support capacity and skills development in climate change response and adaptation planning.

The findings of this study have expanded the understanding of climate change adaptation mainstreaming within municipal planning, allowing for targeted support to local government to be able to mainstream climate change adaptation into planning instruments and processes, to ultimately contribute to the development of more resilient cities and towns. The two atypical cases have illustrated overarching themes wherein both enablers and barriers to mainstreaming exist. Thulamela and Cape Town are two very different cases where the only

thing they share is the goal to mainstream climate change adaptation, however very similar findings emerged on what supports and what hinders climate change adaptation mainstreaming into municipal planning. The results from these two atypical cases allow the inference that the enabling and hindering factors that emerged are likely relevant to all or most municipalities in South Africa.

5.2. Summary of contributions made

There has been extensive research into the barriers and enablers of climate change adaptation and mainstreaming within local government (e.g. Moser and Ekstrom, 2010; Measham et al., 2011; Pasquini et al., 2013; Uittenbroek et al., 2013; Biesbroek et al., 2014; Eisenack et al., 2014; Ekstrom and Moser, 2014; Oulahen et al., 2018). It has also been widely recognised that municipal planning is a very appropriate avenue for mainstreaming (e.g Sharma and Tomar, 2010; Heazle et al., 2013; Uittenbroek et al., 2013; Rauken et al., 2015; Wamsler, 2015b; Ogato et al., 2017; Runhaar et al., 2018; Santhia et al., 2018; Vincent and Colenbrander, 2018; Reckien et al., 2019). There is however limited research on what exactly climate change adaptation mainstreaming within municipal planning looks like or what the challenges and opportunities are, particularly in the South African context. In a recent study commissioned by DEFF, a climate change adaptation research agenda was developed for South Africa. One of the gaps identified in current knowledge and research was that there is a widespread lack of understanding and evidence on how climate change adaptation should be mainstreamed into planning and then implemented, across different scales (ACDI, 2018). Further, there was a call for practical as well as policy guidance on how to mainstream climate change adaptation in government (ACDI, 2018). This study addresses this gap in part by offering some insight into how local government can mainstream climate change adaptation into municipal planning processes and instruments, and identifying key areas of intervention or support. The study looked at climate change adaptation mainstreaming through a strong municipal planning lens, bringing some of the unique realities of municipal planning and local government into the discourse on climate change adaptation and mainstreaming, particularly in South Africa. The importance of following a mainstreaming approach that is relevant to the local context was illustrated using a comparative case study research design. Contributions have been made to both the field of local government and municipal planning, as well as to the field of climate change adaptation mainstreaming to further understanding in each, but also in the important space where the two fields intersect.

5.3. Future research

As is the nature of research, additional questions emerge throughout the research process. One specific research question emerged from this study related to the actual implementation of mainstreamed climate change adaptation projects and projects with adaptation benefits.

One of the delineations, as well as a limitation of this research was that it did not look into the implementation of climate change adaptation projects and initiatives. The study looked at planned implementation, but not actual implementation. However, implementation may be an important factor to understand better the effectiveness of climate change adaptation as a response measure in local municipalities. Planning for implementation is one of the steps within the planning process that the cases struggled to mainstream the most. To explore the actual implementation of climate change adaptation projects and initiatives would allow a deeper understanding of the mainstreaming process as part of the planning process, provide insight into how to monitor such projects and initiatives to be able to measure impact, and to ultimately improve the way local government does adaptation planning.

This study illustrated the depth of information that can be gathered and the knowledge that can be gained by strategically-selecting information-rich cases, and exploring them through a critical pragmatism lens. The atypical cases were able to provide insight into a complex phenomenon from very different experiences and context. Similarly, research looking into actual implementation of climate change adaptation initiatives through mainstreamed planning, may greatly benefit from looking into strategically-selected and information-rich cases. Critical pragmatism and its relevance for real-world planning research is particularly well-suited for research on implementation where interactions between rules, resources, and ideologies emerge strongly.

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APPENDICES

Appendix 1: Informed consent form

University of Pretoria
Faculty of Engineering, Built Environment & Information Technology
Department of Town & Regional Planning
SSB890 Dissertation 890

INFORMED CONSENT

Good day,

You have been selected to participate in the research study titled *Incorporating climate change adaptation into South African local government settlement planning functions*. Please to take a moment to read and sign the informed consent form.

1. PURPOSE OF THE RESEARCH

The aim of this study is to explore how climate change adaptation can be integrated into South African local government settlement planning functions by describing cases where climate change adaptation and integration into local government planning functions have been undertaken. For this research a comparative case study design will be used. Thulamela Local Municipality and the City of Cape Town have been purposefully selected as cases.

This research is funded by the Green Book project. The *Green Book – Settlement Planning and Design Guidelines for Climate Change Adaptation in South Africa* project is co-funded by the Council for Scientific and Industrial Research (CSIR) and the International Development Research Centre (IDRC) in Canada. The Green Book aims to support local government decision-making by presenting evidence for adapting settlements to climate related risks and vulnerabilities, as well as the necessary guiding principles to do so. This research will also be used to support the Green Book by identifying pathways for implementation and ensuring that outputs are relevant to local government.

2. PROCEDURES

If you are willing to make a contribution to this research, it would be appreciated if you would participate in an interview to respond to questions relating to your professional experiences

related to climate change adaptation and mainstreaming within local government planning functions. The interview should take between 1 and 2 hours, depending on your inputs and level of participation. With your permission, the interview will be audio recorded. Initial results from your municipality will be shared with you and other key persons within the municipality in the form of a presentation and focus group discussion. The purpose will be to ensure that case specific conclusions best represent reality, as experienced by officials. This session will take between 2 and 3 hours, depending on inputs and level of participation. The researcher's interaction with you may cause you some inconvenience by taking you away from your normal daily activities while you participate in the interview and focus group discussion. Apart from that, we do not foresee any discomforts or risks to you.

Please indicate permission for the following:

Permission to contact you in the near future	YES	NO
Permission to audio record interview	YES	NO

3. CONFIDENTIALITY

Any information that is obtained in connection with your participation will remain confidential and will not be disclosed. Confidentiality will be maintained by the researcher not stating any names or link any other personal information to the inputs that will be put into the final research report.

The final research report can be made available upon request from the researcher after it has been evaluated by the University of Pretoria.

All transcripts will be kept on a secure server with a password only known to the researcher and their supervisor.

4. PARTICIPATION AND WITHDRAWAL

You can choose whether to participate in this research or not. If you agree to participate, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you do not want to answer and still contribute to the research. The researcher may withdraw you from this project if circumstances arise which warrant doing so.

5. IDENTIFICATION OF RESEARCHER

If you have any questions or concerns about the research, please feel free to use the contact below.

Researcher: Amy Pieterse

012 841 4220

083 652 1645

apieterse@csir.co.za

6. INFORMED CONSENT

I have read through the information provided to me and was given the opportunity to ask questions and these questions were answered to my satisfaction. I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the research may be used for the purposes of publication.

I hereby consent voluntarily to participate in this research.

Upon signature of this form, the participant will be provided with a copy.

Name of Participant	**Date**	**Signature**

Researcher	**Date**	**Signature**

Appendix 2: Interview and group interview schedule

To be conducted in a conversational manner to gain as much learning from interviewee's professional experiences as possible.

Introduction

- Personal introductions
    - Introduce myself
    - Ask interviewee(s) about their position at the municipality, what they do, and how long they have been involved in climate change and adaptation.
- Background to the study
    - Provide background to the CSIR/IDRC Green Book project and how this research will also contribute to it.
    - Provide detail about Master's research and the aim of the study.
- Purpose of the interview
    - Why this case study was selected and how this interview will contribute to the study
- Give overview of consent to participate form and have participant sign
    - Discuss confidentiality and participant rights
    - Request permission to record discussion

Themes and guiding questions

Activities and impact

- How long has the municipality been active in climate change and adaptation?
- What sort of awareness or learning around climate change and adaptation have you and other officials in the municipality been exposed to?
    - Who facilitated this?
    - What has the focus of this been?
    - Do you feel it has been sufficient?
    - In what areas are more exposure, awareness and learning required?
    - What are some of the projects and initiatives you have been involved in within the municipality in terms of climate change and adaptation?
- What organisations or national and provincial departments were involved in these projects and initiatives, if any?

    - What were the intentions and outcomes of these projects and initiatives and were they achieved?
    - What are/were the successes and gains from these projects and initiatives?
    - What are/were some of the challenges with these projects and initiatives?
    - What contributed to these successes and challenges?
        - Support from whom and which actors?
        - Leadership? Technical/Political?
        - Institutional/political stability?
        - Clarity of roles and responsibilities?
        - Structures, systems, processes and procedures?
        - Communication?
        - Incentives? (E.g. funding)
        - Requirements/Sanctions?
        - Networks and partnerships?
        - Capacity and resources?
        - Community involvement/support?
- What efforts have the municipality made to mainstream climate change adaptation within normal planning functions?
    - Spatial planning
    - Land use management
    - Sectoral planning
- Does the municipality sit on any committees around climate change, adaptation, mainstreaming, alignment or intergovernmental planning? Has sitting on these committees facilitated mainstreaming?
- What efforts are made in support of integrated or interdepartmental planning?
- Is there a specific department or person that champions climate change and mainstreaming?
- At which level is adaptation and mainstreaming being driven?
- Do you think that all your efforts to mainstream climate change adaptation within planning functions are captured in your plans and strategies?
    - What was the process that led to the inclusion of climate change adaptation and other responses in your plans? (BEPP, IDP, SDBIP, SDF, LUMS/Town Planning Scheme) – *Refer to examples.*
- Has the mainstreaming efforts had any impact on planning processes, and how? Is there anything that you do differently?

- How has mainstreaming efforts within the municipality changed the way you do your job, if at all?

Need

- Is there any (additional) support that you need to further mainstream climate change adaptation and response into your municipal planning functions and processes?
    - In what areas?
    - In what form?
    - Support by whom or which actor?
- Which areas do you think are easiest to mainstream in and which do you think more work is required?
    - Spatial planning
    - Land use management and development controls
    - Sectoral planning
- What resources do you think are needed to further support mainstreaming?
- What skills and capabilities do you think are needed to further support mainstreaming?
- What information do you think are needed to further support mainstreaming?
    - Information on climate projections, settlement growth, specific settlement risk profiles, and appropriate adaptation options?
    - In what form would you prefer to access information to support adaptation planning?
    - Would additional training be needed on how to apply the information?

Closing

- Thank interviewee(s) for participation
- Actions to be taken

Each interview will be recorded and key responses will be noted by the researcher.