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Shooting at a Moving Target: The Complexity of Evaluating and Monitoring the Adaptive Capacity to Climate Change of Local Government Institutions in South Africa: A Study of the Eastern Cape Province.

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FACULTY OF SCIENCE

SCHOOL OF GEOGRAPHY, ARCHAEOLOGY AND ENVIRONMENTAL SCIENCE

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

SHOOTING AT A MOVING TARGET: THE COMPLEXITY OF EVALUATING AND MONITORING THE ADAPTIVE CAPACITY TO CLIMATE CHANGE OF LOCAL GOVERNMENT INSTITUTIONS IN SOUTH AFRICA: A STUDY OF THE EASTERN CAPE PROVINCE.

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A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

Supervised by Prof. Mulala Danny Simatele

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Declaration

I, Siyaxola Ernest Gadu, declare that Shooting at a Moving Target: The Complexity of Evaluating and Monitoring the Adaptive Capacity to Climate Change of Local Government Institutions in South Africa: A Study of the Eastern Cape Province presents my work, and that all the sources that I have used and quoted in this study have been indicated and acknowledged in the form of reference.

Furthermore, this thesis is being submitted for the award of the degree of Doctor of Philosophy to the Faculty of Science at the University of the Witwatersrand in Johannesburg, Republic of South Africa. This is the first time I am submitting this thesis for examination, and it was not submitted previously for similar purpose at another institution.

Signature:  Date: 3rd June 2024

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Abstract

It is no longer a myth that natural catastrophic events associated with varying climate are increasing globally, with severe and devastating consequences in poor countries, particularly in Sub-Saharan Africa, where many of the world's poor people reside. Thus, the emphasis on adapting to varying climate is no longer optional, or a deferred problem into the future, but rather an urgent matter of concern which must be considered to be a policy priority. Countering the retrogressive climate variation challenges on economic development and ecological degradation, the South African government has, in the last two and half decades, embarked on the progressive formulation of different policy instruments and strategic frameworks to curb and minimise the effects of climate variation on all economic sectors. Applying research techniques from the qualitative research approach and existing literature, this research explored the complexities of evaluating the institutional adaptive capacity to climate change in municipal institutions of South Africa, with particular focus on the Eastern Cape Province.

The research outcomes indicate that, although much remains to be achieved, some level of success has been realised, particularly in the space of policy formulation, albeit with a poor record of implementation. While the policy sounds good and is solution-driven, the implementation of the programme at local levels to achieve the desired goals, however, remains a significant challenge due to institutional and capacity challenges. In addition, the research further highlighted the fragmented climate change governance system which has posed significant systemic challenges, and these have tended to constrain decision-making and implementation processes. The institutional and capacity challenges create an unconducive environment for adequate coping strategies, and an evaluation of institutional adaptive capacity at municipal level across the country. The study findings also stressed the prominence of indigenous knowledge, and the alliance between the opportunities presented by climate variation and Sustainable Development Goals. This study further emphasized the importance of developing a reliable system to assess and monitor the institutional coping capacity at municipal level that can compare adaptive capacity of different institutions and assist in resource allocation.

Keywords: Climate change adaptation, climate change governance, institutional adaptive capacity, institutional reforms, climate resilience

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List of Abbreviations and Acronyms

ACCRA	Africa Climate Change Resilience Alliance
ACW	Adaptive Capacity Wheel
ADM	Amathole District Municipality
CCVARF	Climate Change Vulnerability Assessment and Response Framework
CNCCP	China National Climate Change Programme
COAG	Council of Australian Government
DEFRA	Department for Environment, Food and Rural Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
ECCCRS	South African National Climate Change Response Strategy
EU	European Union
GEF	Global Environmental Facility
IDP	Integrated Development Plan
LM	Local Municipality
MDG-F	Millenium Development Goals Fund
MLNREP	Ministry of Lands, Natural Resources and Environmental Protection
MM	Metropolitan Municipality
NAPA	National Adaptation Program Action
NCCR	National Climate Change Response
NCCRS	South African National Climate Change Response Strategy

NGO	Non-Profit Organisations
PCCAA	Participatory Climate Change Adaptation Appraisals
RRIA	Rapid Risk and Institutional Appraisal
SALGA	South African Local Government Association
SDG	Sustainable Development Goals
UK	United Kingdom
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

CHAPTER ONE
FRAMES OF REFERENCE

1.1. Introduction

Climate variation is an unsettling issue for the current generation, as it disturbs ecological and anthropological systems globally (Abegunde et al., 2019). It puts in danger the current conditions of the planet (Muller and Shackleton, 2014). Furthermore, varying climate is more than an environmental menace, it is a complex and cross-cutting issue that threatens the stability of society (Dale et al., 2020; Samuels et al., 2022). Similarly, Patterson and Huitema (2019), concur that climate change is adding to existing ecological and developmental struggles of communities. The impacts of climate change affect an already complex social setting with limited resources (Ndebele-Murisa, et al., 2020; Thomas et al., 2019). Even though developed countries such as Australia are supposed to be less susceptible to varying climate compared to the developing countries, damages caused by climate change impacts have raised red flags about the level of adaptation in those regions (Moser and Ekstrom, 2010). Even though there is abundance research about response to climate change, it persists to be a challenge for governments worldwide (Sietchiping, 2006; Faling et al., 2012). Subsequently, local governments across the world are experiencing complex effects of the phenomenon and are struggling to cope (Huq et al., 2006; Baker et al., 2012).

Governments, through their institutions, have an obligation to address environmental challenges, such as climate change (Adger et al., 2003; Young and Lipton, 2006 Beunen and Patterson, 2019). Gregorio et al., (2019) indicate that adapting to varying climate has a firmer local context than mitigation. Coping to climate variation is regarded as a local activity (Rosendo et al., 2018), due to localisation of the impacts (Mees et al., 2019). Hence, scholars indicate that the municipal institutions are essential for coping strategies (Landauer et al., 2019, Lenhardt, 2020), as they are the first line of defence for communities that are facing the adverse impacts of the phenomena (Mees, 2017; Santhia et al., 2018; Birchall and Bonnett, 2021).

The realisation of institution's adaptation actions is dependent on its adaptive capacity (Agrawal, 2008). Thus, building the capacity of institutions is important for coping with the varying climate (Brown and Sonwa, 2015). According to Engle, (2011), adaptive capacity is concealed within the system, thus, researchers struggle to measure it until it is realized after

the system is disturbed. In essence, the coping ability of an institution is only known after the climate-related disaster event. Improvement of adaptive capacity in an anticipatory manner, in advance of risk exposure, is ideal to minimise the imminent impacts of climate variation (Vincent, 2007). Therefore, enhancing adaptive capacity is necessary for long-term adaptation (Siders, 2019).

Climate change is a phenomenon that can be considered as a moving target due to its complexity in terms of its implications on socio-economic systems, coupled with impacts on infrastructure and natural environment (Simatele and Simatele, 2015). Because of this, the evaluation and monitoring of coping responses is necessary for progression and development of adaptation techniques, and for informing adaptation and implementation priorities (Hölscher et al., 2019). However, some scholars point out that evaluating the coping ability to reduce effects of varying climate is a complicated assignment (Engle, 2011; Hogarth and Wojcik, 2016; Patterson and Huitema, 2019). Hence, there are no agreements in place on how to quantify the coping ability for climate variation, particularly in the context of institutions (Simpson et al., 2021).

Different societies, regions, and institutions are exposed to different climate variation related threats and opportunities and will also differ in response capacities to confront these impacts and opportunities (Ivey et al., 2004; Berkhout, 2012; Oduniyi et al., 2019). Therefore, adaptive capacity to climate variation varies from specific country to country, community to community, institution to institution, and household to household (Kom et al., 2022). Hence, even if faced by the same climate change impacts, different institutions may have different determinants of coping capacity, challenges, and drivers of coping (Grothmann et al., 2013). Additionally, climate change (Engle, 2011) and coping ability to varying climate (Juhola et al., 2012) varies over time. Thus, adaptation actions vary and mainly depend on the context, resources required, and resources that are available (Regmi and Bhandari, 2013).

Several scholars argue that evaluation and monitoring of climate change responses is important to drive progress (Amundsen et al., 2018; Morecroft et al., 2019), learning which responses are useful (Holscher et al., 2019), and informing adaptation funding and implementation priorities (Singh et al., 2022). Similarly, Olazabal et al., (2019) argue that tracking of adaptation progress is essential for governments at different spheres, particularly in developing countries, for effective planning and prioritising resources. According to Haider (2019), climate change adaptation can be evaluated at several levels, including at an institutional level. Similarly,

Juhola and Kruse (2015) are of the view that the assessment of adaptive capacity provides crucial information in the development of coping strategies at all governance levels. Vincent (2007) argues that there is bias towards evaluation of coping ability at national level. In contrast, Amaru et al., (2013) opined that the assessment of coping ability at local level is more effective since varying climate response decisions are made at this level. In view of this, there is consensus among scholars that adaptation and the development of coping measures must be promoted at local level as the impacts are usually localised (Agrawal, 2008; Juhola et al., 2012). Thus, the adaptive measures are more effective and suitable when they are designed to be context specific, because the manifestation of climate variation commonly differ in nature within a country, province and municipality (Juhola et al., 2012).

1.2. Thematic considerations

Policy is the definite route that offers direction for addressing certain distresses faced by society (Torjman, 2005). Policies are a set of objectives accompanied by the means of implementation (Ball, 1993; Lim et al., 2005). Therefore, the policy is developed and implemented to achieve a specific objective for the benefit of the public; and governments are the main policymakers (Torjman, 2005). Coping to varying climate is an old concept, people have adapted to both short and long-term changes for years. What is new, however, is the idea of incorporating future climate threat into policy development (Lim et al., 2005). The importance of coping mechanism for varying climate has become an important topic in global climate change related agendas in recent years (Williams et al., 2019; Kauffman and Hill, 2021; Kalbarczyk and Kalbarczyk, 2022). However, van den Brink and others (2014) indicate that climate issue is a relatively new challenge that does not conform to regular routines, and systematic problems settings and solutions. As a result, climate variability is a key policy challenge nowadays (Meijerink and Stiller, 2013). Kolström et al., (2011) opined that, at a policy level, adjustments in economic, political, and social systems are necessary to successfully build resilience for varying climate.

There is universal consensus that adaptation policy response by government is vital for building climate resilience (Smit and Skinner, 2002). Hence, coping mechanism for varying climate is now a key subject in scientific inquiries and policy negotiations (Huq et al., 2004; Tschakert and Dietrich, 2010; Meijerink and Stiller, 2013). In addition, institutions are essential for development, promotion, coordination and sustaining adaptation practices (Regmi and Bhandari, 2013). Thus, climate change adaptation of a region, or country, is dependent on the

state of the institutions (Artur and Hilhorst, 2012). Inevitably, the success of climate coping strategies of a region is reliant on the state of the municipal institutions (Agrawal and Perrin, 2009). Additionally, the successful coping with climate variation, and implementation of climate response policy is dependent on the coping ability of the institutions (Agrawal, 2008; Thi Hong Phoung et al., 2017). Thus, capacity to endure and to be resistant to impacts of climate variation is important to commence coping mechanism (Tompkins and Adger, 2004).

Climate variation land on an already complex social setting with limited resources in developing countries (Ndebele-Murisa, et al., 2020; Thomas et al., 2019). Climate change adaptation competes with other needs of the community, such as, road maintenance, electricity supply and building community facilities in municipalities (Measham et al, 2011). In addition, adaptive actions are delayed because manifestation of varying climate is viewed as a future event, hence, policymakers at a local level prioritise other socioeconomic challenges above climate change adaptation (Dannevig et al., 2013).

South African Context

Since 1994, South Africa went through intense reform programs for social, economic, and political reconstruction, with the aim of redressing past socio-economic imbalances (Saleth and Dinar, 2005; Backeberg, 2005). Institutional reform in South Africa has created a hierarchy of three levels of decision making: operational, institutional and policy level. Therefore, for any effective institutional reform to occur in the country, it is necessary to involve all three decision makers (Backeberg, 2005). Climate variation policies are developed at a national level of government and implemented at provincial and local government level (Chersich and Wright, 2019).

South Africa is experiencing the effects of varying climate (Elum et al., 2017), due to alteration in temperature and precipitation patterns (Busayo and Kalumba, 2021; Wale et al., 2022). In addition, the political history of South Africa created major socio-economic challenges. Therefore, the country is confronted by many social, economic and environment issues, besides the menace of climate variation (Pasquini and Shearing, 2014). Municipalities are tasked with the responsibility of service delivery in the country (Millington and Scheba, 2021). However, most South African municipalities are struggling to achieve their developmental mandate due to various reasons, ranging from political issues to capacity constraints (Pasquini et al., 2013; Pasquini and Shearing, 2014), even without the added pressure to build climate resilience

(Santhia et al., 2018). Thus, varying climate is connected to other social development challenges (Santhia et al., 2018). In essence, chosen climate change adaptation measures should not hinder service delivery, allow development, and create economic opportunities due to the history of the country (Cartwright et al., 2013).

The South African government has established a policy framework for mitigation and adaptation to varying climate (Montmasson-Clair and Zwane, 2016; Chersich and Wright, 2019). Ziervogel et al., (2014) indicates that the government published the National Climate Change Response (NCCR) White Paper in 2011, which outlines the duties of national government in terms of the varying climate. The NCCR serves as a guide for what is expected from government institutions and, also outlines what is needed by all provinces and municipalities to achieve the goals it intends to attain (Ziervogel et al., 2014; Montmasson-Clair and Zwane, 2016). The NCCR provides short to medium and long-term guidelines for policy development and implementation (Leck and Simon, 2018). NCCR is for adequate coping from effects of varying climate through mechanisms that increase and sustain the coping capacity of communities and vital sectors of the country (DFFE, 2011). The government released a draft of the updated version of the NCCR in 2018. The improved version of the NCCR contains new ways through which climate change concerns can be incorporated within all sectors of government (Chersich and Wright, 2019). The other essential climate change adaptation document is the South African National Climate Change Strategy. It is a reference point for all climate resilience activities in the country (Chersich and Wright, 2019). The strategy is the ten-year plan of government, describing the main strategic areas, with measurable outcomes. The main purpose of strategy is to ensure that different government institutions at different levels, and the private sector, integrate and reflect on climate coping mechanism (Chersich and Wright, 2019).

Although most South African government authorities, at local level, are generally aware of the need for action on adaptation strategies and, have an understanding and ideas on what to do (Montmasson-Clair and Zwane, 2016), these institutions commonly lack both human and financial capacity (Koch et al., 2007). Hence, building the capacity of institutions is essential stages for climate resilience (Brown and Sonwa, 2015). Siders (2019) concurs that building a coping ability of a social system is an integral part of climate resilience. Similarly, several researchers have highlighted the importance of one of the SDGs, number 13 - Climate Action, which encourages the strengthening of the resilience and adaptive capacity (Nhamo and Agyepong, 2019; Williams et al., 2019). Similar to other developing countries, researchers

argue that it is necessary to increase the coping ability to varying climate in South Africa (Busayo and Kulumba, 2021). However, due to a high variety of adaptation issues and the context-specific nature of adaptive capacity, there is no single formula agreed upon for building adaptive capacity (Mikulewicz, 2018; Siders, 2019).

Rationale of the Study

Regmi and Bhandari (2013) opined that there are still disagreements on the trajectory of climate change adaptation, particularly on how it should emerge and be measured. Other scholars concur by indicating that there is no agreed-on metrics, techniques, framework, or indicators to measure climate change adaptation (Singh et al., 2022). Nonetheless, the evaluation and monitoring of coping strategies is valuable in progression and development of adaptation techniques, and for informing adaptation and implementation priorities (Hölscher et al., 2019). On the contrary, researchers indicate that evaluation of coping ability to varying climate is a difficult mission (Engle, 2011; Patterson and Huitema, 2019), due to a high variety of adaptation issues and the context-specific nature of adaptive capacity (Mikulewicz, 2018; Siders, 2019). Similarly, Grothmann et al., (2013) opined that the disagreement on adequate techniques for the assessment of the organisation's adaptive capacity to varying climate is caused by the complicated and context specifics of adaptation sites.

The local government institutions are vital for coping mechanism of the vulnerable communities and regions, as they are the closest government institutions to the destruction of climate variation. As a result, it is important to investigate the institution's coping ability to varying climate impacts, as it projects the success level of coping mechanisms. However, concept, framework, or technique to assess coping ability of a social structure is yet to be invented (Baudion and Ziervogel, 2017; Siders, 2019). Thus, this study focused on examining and understanding the evaluation and monitoring of the institutional adaptive capacity to climate change at the local government level in the Eastern Cape Province of South Africa.

1.3. Research questions.

Considering the above observations, the research process was guided by the following questions:

i. To what extent does the government policy framework(s) promote the institutional adaptive capacity to climate change at local government level of the Eastern Cape Province?
ii. What are the barriers, challenges, lessons, and opportunities that exist in institutional adaptation to climate change at the local government level?
iii. How is the institutional adaptive capacity to climate change evaluated and monitored at the municipal level in Eastern Cape Province?
iv. What are the implications of the findings of this study, in the wider context of South Africa?

1.4. Research aims and objectives.

In view of the above, the aim of this study was to examine the institutional complexities for the development of a system that can evaluate and monitor the adaptive capacity to climate change at the South African local government level.

The objectives of the study were:

i. To establish the perspectives on the role of policy framework in promoting the adaptive capacity to climate change of local government institutions in the South Africa, with specific focus on the Eastern Cape Province.
ii. To create an inventory of institutional dynamics that impact the institutional adaptation to climate change process at the local government level.
iii. To establish how the institutional adaptive capacity to climate change is evaluated at the local government level in the Eastern Cape Province.
iv. To contribute to academic literature in the insitutional climate resilience discipline in the country.

1.5. Theoretical Considerations and Literature Review

This section of the study is comprised of two subsections; it commences with the explanation of the theoretical considerations of the research, and it concludes with the highlights of the reviewed literature, which is thoroughly detailed in chapter 2 of the study. Although a literature review is important to uncover key concepts and constructs related to the topic of interest, it is

important to identify one or more theories which can help to interrogate the research questions (Nayak and Singh, 2015). There are several theories that focus on the climate resilience of institutions: for instance, the Participatory Climate Change Adaptation Appraisals (PCCAA), Rapid Risk and Institutional Appraisal (RRIA) and the Adaptive Capacity Wheel (ACW). RRIA and the ACW theoretical approaches were considered for this study.

Simatele (2010) indicates that RRIA was developed by Moser et al., (2010), and it is closely linked to PCCAA. RRIA offers a top to bottom evaluation of the policy frameworks for climate resilience, from appropriate government levels mandates, regulations, budget allocations, programs, and policies concerning climate change (Moser and Stein, 2010; Simatele, 2010). This theoretical approach consists of an analysis of the institutional structure, evaluation of relevant policies, regulations, and mandates from all spheres of government, and an assessment of relevant programs and practices from the viewpoints of the different-level stakeholders (Moser et al., 2010). Thus, researchers indicate that RRIA was developed with an intent to identify policy domain, policies, programs, and institutions that constrain or facilitate the capacity for climate resilience, and those that are vital in development, execution, and monitoring of adaptation strategies in the urban setting (Moser et al., 2010). Similarly, Simatele (2010) states that the framework identifies institutions that either assist or hinder the coping ability of the urban poor when faced with natural disasters that are associated with varying climate.

ACW is another theoretical concept that was considered in this study. It is a systematic list for evaluation of coping ability of institutions for climate resilience, which was developed by Gupta et al., (2010). The ACW framework is a qualitative tool that can measure the institutional coping capability for climate resilience (Hurlbert and Gupta, 2017). In addition, the wheel can used to generate quantitative results that can be utilized to rank the score of adaptive capacities of different institutions. The ACW has twenty-two indicators for six determinants (variety, learning capacity, room for autonomous change, leadership, availability of resources, and fair governance) of institutional adaptive capacity (Siders, 2019). The framework can assist academics and decision-makers in measuring the coping ability of the institutions and assesses whether institutional reforms are required for effective climate resilience (Gupta et al., 2010).

Mikulewicz (2018) opined that there is limited research investigating climate resilience responses in third world nations, particularly at local level. Other researchers opined that climate resilience has numerous stakeholders; for example, individuals, communities, all

spheres of government institutions and global organisations (Amaru and Chhetri 2013). However, many scholars indicate that adaptation is commonly a responsibility of the government and public bodies to protect or, for the benefits of their citizens (Young and Lipton, 2006). Hence, Islam and Nursery-Bray, (2017) argue that formal organisations are useful for purposive resilience and for bridging the gap between community and external interventions. Similarly, Regmi and Bhandari (2013) argue that the institutions are vital for development, promotion, coordination and for sustaining adaptation practices. Thus, institutional establishments play a crucial role in addressing environmental issues, such as climate change adaptation (Beunen and Patterson, 2019).

Institutions are complex concepts that are socially constructed and established through discourse (Metcalfe, 2001; Phillips et al., 2004). In addition, many researchers indicate that these establishments control access to resources (Agrawal, 2008; Simatele, 2010; Brown and Sonwa, 2015). Thus, Lawrence (2008) points out that the organised establishments are influential, and they affect the behaviours, beliefs and opportunities of humans, organizations, and communities of a region. However, many scholars indicate that the awareness of the necessity of climate resilience is a new concept (Regmi and Bhandari, 2013; Mees, 2017). Additionally, Regmi and Bhandari (2013) indicate that the traditional institutional settings in place are too fragmented, sectoral, and isolated to build climate resilience. Hence, it has been argued that it is necessary for institutions to revise their traditional practices to address the complex effects of climate variation (Regmi and Bhandari, 2013; Beunen and Patterson, 2019).

Institutional reforms are the purposive changes in the institutional structure that will result in the institutional evolution (Saleth and Dinar, 2005; Boeri, 2011; Beunen and Patterson, 2019). Many researchers opined that institutional restructurings are essential because they change the institutional setting, by generating significant new points of interaction between the authorities and the public and, within the government institution (Baiocchi et al., 2006; Beunen and Patterson, 2019). Aylett (2015) alleges that institutional structures that are currently in place reveal that climate change planning is positioned on the peripheral and, has limited resources allocated to it within local governments. Thus, Mees (2017) argues that institutional reforms are necessary to successfully adapt to climate change. However, Heyns (2005) points out that the success of institutional reform is dependent on skill and capacity within the institution.

Many scholars point out that building the capacity of institutions is a fundamental phase of climate resilience (Kashaigili et al., 2009; Regmi and Bhandari, 2013; Brown and Sonwa, 2015,

Santhia et al., 2018). However, Mikulewicz (2018) argues that due to a high variety of adaptation issues and the context-specific nature of adaptive capacity, there is no single formula agreed upon for building adaptive capacity. In addition, Fu et al., (2012) indicate that there is no agreed-on technique, framework or indicators to measure climate change adaptation.

1.6. Methodological Consideration

Methodological consideration is a discussion on the methodological choices that were applied in the study. It is a summary, and a detailed argument on the methodology is in Chapter Three. The methodology of the research is guided by the questions the study seeks to answer. This study was not statistically driven; it looked at the qualitative aspects of coping ability for climate variation. Thus, the study applied a qualitative research methodology. The qualitative research approach that was selected is called phenomenological methodology. This research methodology aims to select sources of data that can help in understanding the experiences, from an insider's perspective and, according to people's own experience (Burns and Grove, 2003). The study utilised primary and secondary sources of data to shed light on the evaluation of the coping capability of local government institutions to varying climate. Interviews, workshop, and secondary data analysis techniques were applied to gather primary and secondary information.

The purpose of interviews is to explore views, personal experience, and beliefs of participants on a specific study area (Gill et al, 2008). The interviews were semi-structured, in-depth, and open ended, to ensure that the participants fully express their views. Even though semi-structured interviews are time consuming, they are best for in-depth investigation (Gill et al., 2008). All the interviews were carried out virtually due to COVID-19 restrictions during data collection stage. A workshop was also applied in the study. A workshop is useful for creating new ideas and concepts, and to evaluate the subject of interest (Thoring et al., 2020). The workshop was face-to-face, as it was conducted when the COVID-19 pandemic subsided. The target population for this study was technocrats that are directly involved in climate change adaptation. A purposive or deliberate sampling method, with assistance from a snowball effect method, was used to determine a population sample for this study. The purposive method selected participants according to their knowledge and experience in the field of interest, and their willingness to share their knowledge (Tongco, 2007). This technique is purpose focused; the researcher only concentrates on people of interest and discounts people that do not fit the

purpose (Nayak and Singh, 2015; Etikan et al., 2016; Mishra and Alok, 2022). The snowball effect method is when a researcher is referred to a person that can assist with data collection. The interviewees were technocrats from the Department of Forestry, Fisheries, and the Environment (DFFE), South African Local Government Association (SALGA), and numerous municipal institutions of the Eastern Cape Province; namely, Nelson Mandela Metropolitan, Buffalo City Metropolitan, Amathole District, Chris Hani District, Mbizana Local, Elundini Local, Ntsika Yethu Local, Port St Johns, Matatiele Local, Mzimvubu, and Kouga Local Municipality. The workshop respondents were from Limpopo provincial government, Polokwane Local Municipality, Lepelle-Nkumpi Local Municipality, Molemole Local Municipality, Blouberg Local Municipality, and Capricon District Municipality.

The primary data was complimented by the secondary data in the form of government gazettes, reports, and archives. The secondary information was useful in identifying the existing policy frameworks for climate resilience and discovering the challenges and barriers of coping mechanism, thus providing an insight into the evaluation processes of coping ability at municipal level. Secondary data analysis is when a researcher analyses an already available dataset that was collected by other sources, with the aim of improving the research, or to answer a new academic question (Glass, 1976; Szabo and Strang, 1997; Kielmann et al., 2012; Johnston, 2014; Nayak and Singh, 2015).

Thematic analysis, using an inductive approach, was applied to analyse the primary data. Kiger and Varpio (2020) define this analysis technique as a structured process that detect, analyse and report repetitive trends that are found in a collected data after a thorough examination. The transcribed interviews and workshop data was categorised into themes of resemblances. The acquired secondary data were analysed using critical discourse analysis and a comparative analysis approach. These methods assisted in interpreting data to answer the "what, why and how" questions on challenges of climate governance at municipal level.

Detailed methodological consideration of the study is provided in Chapter Three.

1.7. Scope and limitations of the Study

The scope of the study refers to the parameters under which the study is setup, what the study entails, and is closely linked to the framing of the problem (Simon and Goes, 2013; Theofandis and Fountouki, 2018). Within the climate resilience, the study focused on climate change

governance, with particular interest on institutional coping ability at municipal level. As mentioned in section 1.2, the focus of the study was on local government in the Eastern Cape Province, South Africa. The institutions that participated in the study were limited to 11 municipal institutions of the province, DFFE and SALGA. The participation of DFFE and SALGA in the research was important, as DFFE is a custodian department for climate change, and SALGA is an advisory institution for local government authorities in South Africa. It was also important to engage participants from other parts of the country (Limpopo Province) to get a better understanding of the landscape of climate change adaptation in the South Africa.

Study limitations are potential weaknesses or concerns that are beyond the researcher's control that may influence the results and the conclusion of the research (Baron, 2008; Theofanidis and Fountouki, 2018; Ross and Bibler Zaidi, 2019). Limitations are associated with the selected research design, time, and resource constraints, and other factors (Theofanidis and Fountouki, 2018). One of the assumptions of the study was that the primary and secondary data were valid and reliable. In some local government institutions, climate change is assigned as a secondary responsibility on technocrats that have other primary tasks. Where necessary, the researcher simplified the technical terms to ensure that the participants understand, and credible data is collected.

1.8. Ethical Consideration

The consideration of the ethical issues is a vital component in demonstrating the credibility of the research findings (Sutrisna, 2009). Ethical merit is when a researcher ensures that dignity, integrity, privacy, safety, and rights of the repondents are protected throughout the research and beyond (Benatar, 2002). Furthermore, according to Bunnin and Tsui-James, (2003), ethics is a matter of a researcher putting the respect for participants above his self-interest. Haggerty (2004) states that academics and graduate students must follow the research ethics protocols. The ethics of this study were guided by the ethical policy of the University of the Witwatersrand. One of the requirements is an approval of an ethical clearance from the university before any fieldwork is undertaken. The application of an ethical permission was submitted and approved by the university; subsequently, the ethical clearance certificate was issued (see Appendix A, on page 140).

There are certain basic principles and standards for ethical treatment of people who participate in the research (Smythe and Murray, 2000). The study required the participation of officials and professionals; therefore, ethical issues such as confidentiality and anonymity, consent, privacy, and withdrawal were considered. According to Benatar (2002) and Bowen (2005), informed consent is an essential part of ethical considerations in any research involving human beings. After reading and understanding the participation sheet, and then agreeing to the recording of the interview, it was made compulsory for the respondents to give permission by signing a consent form before the interviews commenced. The participants were also made aware that they could end the interview at any stage if they feel uncomfortable. There was no interaction with people who were within vulnerable groups at any stage of the study.

Since the participants of this study were technocrats, the harm that could arise would be consequences of stating what may not sit well with their institution. Moreover, it is impossible to guarantee anonymity to participants in this study because permissions from the institutions were obtained before the employees were interviewed. The other ethical issue that could arise is that the study could be seen as interrogation of competency of participants in their jobs, and some participants could be uncomfortable about that.

1.9. Structure of Thesis

This thesis consists of six chapters. **Chapter One** comprise of a short but detailed summary of the document. It presents the introduction, problem statement, research questions, significance of the study, ethical considerations, and the scope of the study. **Chapter Two** comprises the review of the existing literature and research relevant to the problem at hand. This chapter consists of a definition of key concepts, contextualising the literature of climate change institutions institution on global, Sub-Saharan Africa and South Africa context. **Chapter Three** presents the methodological consideration section of the study. This part details the methodology, study design, procedures for data collection and the researcher's reflections after applying theory to practice. **Chapter Four** is the presentation of the empirical evidence that was found by the researcher during data collection. **Chapter Five** contains the analysis and discussion of the empirical evidence presented in chapter Four and relating it to reviewed literature in chapter Two. **Chapter Six** consists of the summary of the study and findings, conclusions drawn from the findings, a discussion, and recommendation for further research.

CHAPTER TWO[1]

THEORETICAL CONSIDERATIONS AND LITERATURE REVIEW

2.1 Introduction

The success of a research is dependent on a thorough review of the literature. The literature review is an evaluative report of existing literature relevant to the area of interest (Nayak and Singh, 2015). After the identification of the research problem, the researcher studies the existing relevant literature to be familiar with the selected problem (Mishra and Alok, 2022). In addition, literature review assesses the knowledge in the subject of interest, and identifies main authors, articles, key arguments, theories, findings, and gaps in knowledge in the research area (Nayak and Singh, 2015). Similarly, Bowen (2005) indicates that prior studies about the subject of interest provide a foundation, background, and context for new research. Thus, it has been argued that there are several aims of looking into the available literature, providing a study context, and justifying the research, avoiding replication of the same study, showing where the research fits into the existing body of knowledge, enabling the researcher to learn from previous theory on the subject, showing how the subject has been studied before, highlighting flaws and gaps in previous research, showing that the research at hand will add knowledge in the field, and help improve, progress or change the topic (Nayak and Singh, 2015).

In view of this, literature reviews are an important part of the research, as they uncover the landscape of the subject of interest, from the current state to the gap in knowledge. This sections looks into the available literature on institutional coping mechanism for varying climate change, particularly the municipal level. The chapter commences by defining key concepts used in the study. It goes on to review the literature on RRIA and ACW theoretical framework. It further explores the institutions and climate resilience from global, Sub-Saharan, to South African context. The chapter concludes by identifying the knowledge gaps and provides the new insights on the evaluation and monitoring of the coping capabilities of municipalities for climate variations.

[1] This chapter is based on a published paper in Climate Resilience and Sustainability Journal, titled, Mind the Gap: The Fissure between Aspirations and Actions in Climate Change Governance at a Local Government Level: A study of the Eastern Cape Province of South Africa) https://doi.org/10.1002/cli2.72

2.2 Definition of Key Concepts

This section is dedicated to defining and explaining, in-depth, the key terms and concepts that are frequently used in this thesis. The terms and concepts are defined below according to how they are used in the thesis.

a) **Institutions** are formal and informal, human-constructed authorities, that shape interactions, expectations, and the behaviour of a society (Agrawal and Perrin, 2009; Brown and Sonwa, 2015; Hogarth and Wojcik, 2016; Dutra et al., 2019; Birchall and Bonnett, 2021). Dutra et al., (2019) define formal institutions as establishments that have laws, regulations, agreements, policies, and plans, whilst the informal institutions are embedded in social norms, practices, and customs. Other scholars view institutions as the embodiment of rules that a society abides by; and as humanly created paradigms that influence human interaction in political, social, and economic settings (Acemoglu et al., 2005; Aoki, 2007). In this study, institutions will be used to mean authorities that oversee governance in the society.

b) **Institutional reforms** are the purposive changes within the institution, that are supposed to yield institutional progress (Saleth and Dinar, 2005; Boeri, 2011; Beunen and Patterson, 2019). Other scholars define institutional reforms as the refinements within an organised establishment with the aim to cause reconstruction at three dimensions of institutional setting; at the level of appropriate political measures, changes in the operational level and changes in the broader outcome such as socio-economic effects (Kuhlmann and Wollman, 2011). The study defines institutional reforms as the purposive changes within the institutions that are required for successful climate resilience.

c) **Climate change adaptation** is the processes, practices, or arrangements to moderate future risks or to capitalise on prospects of varying climate (Juhola et al., 2012). Subiyanto et al., (2020) argue that it is the deliberate adjustments that are made to adapt and to take advantage of the actual and expected varying climate, and its effects. This study adopts the same definition.

d) **Climate change awareness** is the familiarity with the key concepts of varying climate (Jan et al., 2020). Jurkenbeck and others (2021) describes climate change awareness as

the concern about and belief in the varying climate problem. This study defines it as the consciousness of the problem of variability of climate, and the need to address it.

e) **Institutional adaptive capacity (coping ability)** is defined as "the inherent characteristics of institutions that empower social actors to respond to short- and long-term impacts either through planned measures, or through allowing and encouraging creative responses from society both ex ante and ex post" by Gupta et al., (2010). The study adopts the same definition.

f) **Evaluation of adaptive capacity** is an important process to help understand how response capacity changes with time (Whitney et al., 2017). Jacobs et al., (2015) view it as a procedure of understanding susceptibility to diverse drivers of varying climate, and to evaluate the need to strengthen the capacity for future potential impacts. The study defines evaluation of adaptive capacity as the process of evaluating the preparedness of the institution to present and future climate change impacts.

g) **Monitoring adaptive capacity** and how the system reacts to changes is an essential process to understanding how to improve the techniques for evaluation and enhancing adaptive capacity (Whitney et al., 2017). The study adopts the same definition.

2.3 Some Theoretical Perspectives

Lack of collaboration to improve techniques have resulted in a lack of progress in the adaptive capacity discipline (Siders, 2019). As a result, complex, interrelated and often overlapping approaches have been used in different studies that attempt to address varying climate (Moser et al., 2010). In addition, there is a lack of theoretical concepts and frameworks to evaluate the coping ability of institutions to varying climate (Grothmann et al., 2013). However, Siders (2019) opined that progression in adaptive capacity research has theoretical and practical value for adaptation science. There have been several theoretical frameworks that were developed to assess the institutional adaptive capacity in recent years. Vulnerability Assessment, Adaptation Framework, Rapid Risk and Institutional Appraisal (RRIA), and Adaptive Capacity Wheel (ACW) are some of the frameworks that are applied to evaluate the adaptive capacity. Even though all these concepts assess the adaptive capacity to climate change, they are not all suitable to evaluate the adaptive capacity of the institutions. RRIA and ACW were developed

to evaluate the institutional adaptive capacity to climate change. Thus, RRIA and ACW theoretical concepts were considered for the study.

Simatele (2010) indicates that RRIA is closely linked to the PCCAA theoretical approach. PCCAA was developed to assist researchers when assessing climate resilience of poor urban communities (Moser and Stein, 2010). Additionally, PCCAA is based on the rationale that the poor population is particularly less climate resilient; therefore, vulnerability is closely connected to individual, household, and community assets (Moser et al., 2010; Simatele, 2010). In assertion of this view, there is consensus that poor populations, particularly from developing world, are highly exposed to effects of varying climate. In essence, the assets of an individual, household, and community, play an important part in climate resilience.

The PCCAA theory is a three-phase analysis of the climatic-disasters event, and the adaptive measures that are in place in the urban poor environment (Simatele, 2010). The first phase of PCCAA is the before stage, which is identification of assets at risk and adaptive measures in place to shield urban poor from climate change natural disasters. The second phase is the "during stage", which focuses on how the urban poor safeguard their assets during the climate-related event. The last phase is the "after stage", which attempts to identify assets and reaction actions that are considered essential in the recovery process, lessen vulnerability, and enhancing long term adaptive capacity to severe natural disasters (Moser et al., 2010; Moser and Stein, 2010; Simatele, 2010). In essence, the last stage relates to one of the objectives of the PCCAA theoretical approach, which is to identify institutions and their significance in climate resilience (Moser and Stein, 2010). Additionally, one of the main characteristics of asset-based approach is that it focuses on local government adaptation policy (Moser et al., 2010).

Institutions play an essential part in shaping the climate resilience of the poor urban communities; thus, it is important to conduct RRIA (Simatele, 2010). RRIA is a top-down review of the varying climate strategies, from relevant national, provincial to municipal level mandates, regulations, budget allocations, programs, and policies concerning climate change (Moser and Stein, 2010; Simatele, 2010). Researchers indicate that RRIA was designed to identify policy domain, policies, programs, and institutions that constrain or facilitate the coping ability to varying climate, and those that are vital in development, execution, and monitoring of adaptation plans in the urban setting (Moser et al., 2010; Simatele, 2010). Hence, the approach is comprised of an analysis of the institutional structure, evaluation of relevant

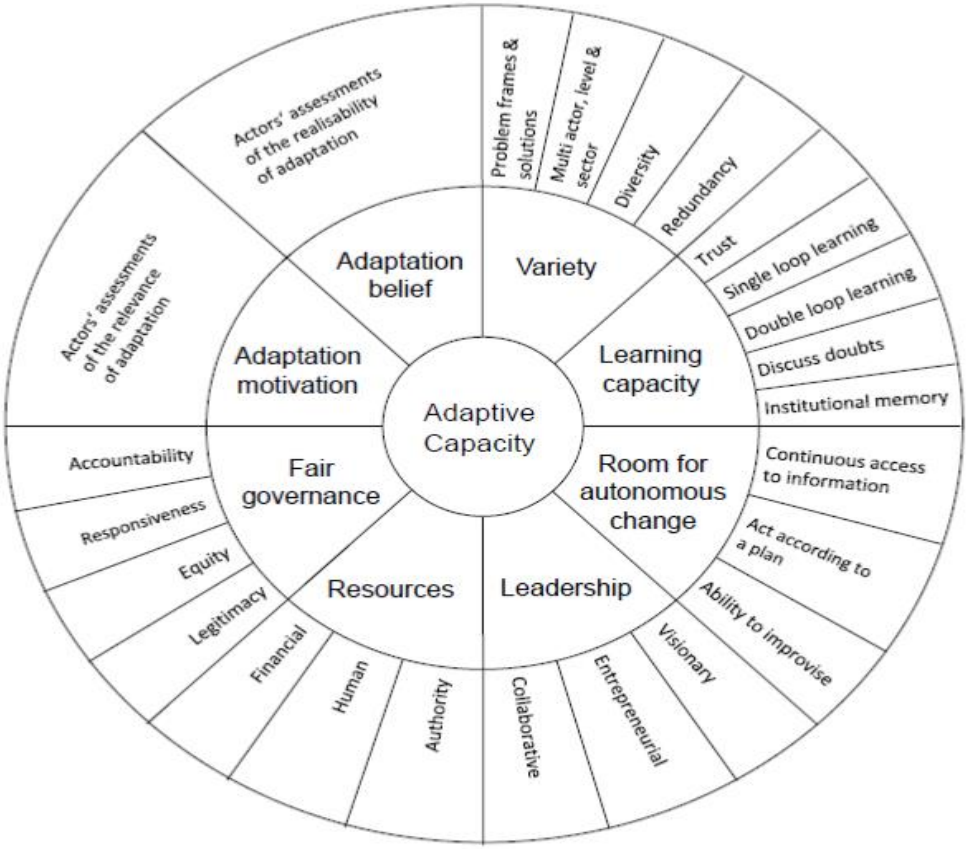
policies, regulations, and mandates from all spheres of government, and an assessment of relevant programs and practices from the viewpoints of the different-level stakeholders (Moser et al., 2010). In view of this, RRIA was designed for poor urban setting; its usefulness is yet to be tested in the poor rural environment.

Adaptive Capacity Wheel is another theoretical framework that was considered in this study. ACW is a systematic list for the evaluation of coping ability of institutions to varying climate, which was created by Gupta and others (2010). It is viewed as a valuable qualitative tool for the evaluation of the institutional coping ability to varying climate (Hurlbert and Gupta; 2017). In addition, Gupta and others (2010) indicate that ACW can generate quantitative results, which can be used to rank the score of adaptive capacities of different institutions. Therefore, it is useful for comparing adaptive capacity of different institutions and promoting self-reflection among climate change stakeholders (Gupta et al., 2010). In view of this, even though ACW is considered a qualitative tool, it can produce quantitative results that can be used to identify institutions with low coping ability for climate resilience.

Adaptive Capacity Wheel has six determinants of institutional adaptive capacity for climate change: resources, variety, fair governance, learning capacity, room for autonomous change, and leadership (Siders, 2019). The dimensions of ACW are generally common in institutions across the world. Thus, according to Siders (2019), ACW is the most cited index in the literature. In addition, Grothman et al., (2013) argue that the wheel is the only comprehensive and operationalised framework for the evaluation of the institutional coping ability for climate resilience. Even though the adaptation field is yet to agree on an adequate framework or tool for the evaluation of institutional coping ability to varying climate, ACW is one of the few practical indexes that are leading the way.

In an effort to improve the ACW framework, Grothmann and other authors (2013) extended the number of dimensions by adding two psychological factors, adaptation motivation and adaptation belief. The figure below demonstrates the ACW determinants and the indicators of the institutional adaptive capacity.

Figure 2. 1 Extended adaptive capacity wheel, including two psychological dimensions.



Source: Grothmnn et al., (2013)

The added psychological dimensions assess the willingness factors in the evaluation of institutional coping ability to varying climate. Motivation and belief are crucial in commencement, execution, and completion of adaptation actions. Hence, they should be added as determinants of institutional coping ability in the ACW, and subsequently be an integral part of the evaluation processes of institutional adaptive capacity.

RRIA and ACW theoretical approaches were developed to measure the coping ability of institutions to changing climate. Additionally, these approaches both examine the policy framework of climate governance and identify barriers of climate resilience of institutions. Therefore, both these theoretical frameworks are aligned to the research, as the study examined the process and complexities of evaluating the institutional adaptive capacity to varying climate at the municipal level in the country, with a particular focus on the Eastern Cape Province.

2.4 Contextualising the Literature on Institutional Adaptation to Climate Change: a Global Context

The mechanisms for climate resilience are an important topic in the global climate stage (Olazabal et al., 2019; Kauffman and Hill, 2021; Kalbarczyk and Kalbarczyk, 2022). In response to the challenges or in anticipation of future risks posed by the phenomena, governments across the world (through its institutions) have the responsibility of coping and be resilient to varying climate on behalf of society (Islam and Nursey-Bray, 2017). Thus, researchers in the environmental governance field argue that governments are crucial in building resilience for environmental challenges such as varying climate (Beunen and Patterson, 2019). Similarly, Regmi and Bhandari (2013) opined that institutions are paramount for development, promotion, coordination, and sustaining adaptation practices. Scholars argue that governments across the world are building climate resilience (Busayo et al., 2019). However, Birchall and Bonnett (2021) argue that climate adaptation planning is a complex task. Therefore, even though institutional coping ability is important; it is a complicated feature to measure.

Dannevig et al., (2013) argue that a lack of legislation has been identified as the root cause for unsatisfactory mainstreaming of adaptation policies within countries of the European Union (EU). However, the United Kingdom (UK) has been one of the prominent nations in climate resilience (Dannevig et al, 2012). The Department for Environment, Food and Rural Affairs (DEFRA), oversees climate change adaptation matters within the English government. DEFRA created the UK Climate Change Programme and Adaptation Policy Framework, in addition, the department is responsible for coordinating and aligning different sectors and government spheres for climate resilience (Massey and Huitema, 2013). The UK government passed a key piece of legislation, called the ‘Climate Change Act of 2008’. This Act provides direction on the evaluation of coping mechanisms and climate susceptibility at different spheres of government (Dannevig et al, 2012). This piece of legislation was adopted as a response to an unsatisfactory effort in the implementation of coping strategies, making it legally mandatory for stakeholders to pursue climate resilience (Massey and Huitema, 2013). In view of this, it is important to ensure that institutions are legislated to pursue climate resilience.

The United Kingdom has a good policy framework for climate resilience at a local level. In 2007, the UK national government published the Local Government Performance Framework. It requires local government to assess their adaptation progress using a set of 198 national indicators. With assistance and monitoring from national government, local government

institutions in the UK are progressive in identifying indicators for climate resilience (Berke and Lyles, 2013). The City of London developed a local climate resilience plan in 2007; the plan was further updated in 2010 and integrated into the city's Local Development Framework by 2011 (Berke and Lyles, 2013). London's climate change strategy was inclusive, as it considered a wide range of stakeholder inputs. Even though that is the case, the UK is struggling to cope with floods. Therefore, it is necessary to investigate the current framework for the evaluation of coping ability to varying climate of municipalities.

In contrast to the UK, other European countries usually prioritise mitigation over adaptation to climate change. For instance, in Norway, national government focus has usually been on the mitigation of climate change rather than coping mechanisms. Consequently, the national drive for local climate resilience is fragile (Wejs et al., 2014). In 2009, the Norwegian government adopted new guidelines on climate and energy planning; unfortunately, its focus is on mitigation while little attention is dedicated to adaptation. Although, some Norwegian local municipalities are adapting to varying climate, the national government guideline for adaptation are lacking (Dannevig et al., 2013). Norway does not have a national policy for adaptation, hence, there is no regulation in place that compels local government institutions to embrace the climate resilience stance. In the absence of mandate and financial support from national government, climate resilience ends up as a peripheral issue at municipal level (Wejs et al., 2014). Fortunately, although formal institutional systems of climate resilience in Norway are generally weak (Wejs et al., 2014), compared to other countries with the same challenge, the nation's response to impact of varying climate is considered good because of the excellent state of the institutions and social equality, and high literacy rate and economic wealth (Dannevig et al., 2013). In consideration of this, strong institutions of a country are vital in climate resilience.

Other countries chose a different route of combating climate change. Research outcome indicates that German cities will experience the effects of varying climate, especially the increase in temperature and precipitation (Gondhalekar and Ramsauer, 2017). Fortunately, climate protection has been established and prioritised as an overarching policy in Germany (Monstadt, 2007). German municipalities have set up expert administrative jurisdictions for climate policy and, have established regional climate programs to endorse energy efficiency, renewable energy, and an upsurge of ecopreneurs. This move demonstrates that the German government chose the mitigation and the promotion of the green industry at municipal level as

a method of climate resilience. Adaptation responses that promote economic development are usually favoured in the politically influenced environment such as government.

Elsewhere, institutional policy reforms are triggered by the signs of varying climate. For instance, the drop of water levels on the Murray-Darling Basin provoked the Australian authorities into amending its water policies and introduced a new Water Act of 2007. Some of the goals of the Australian Water Act of 2007 are, enhancing social, economic, and environmental outcomes, limiting water extraction, conserving biodiversity, and managing risks such as climate risks (Alexandra, 2017). The basin had since recovered about 20 per cent of its historic water use since the inception of the Act (Alexandra, 2017). The implementation of these water reforms went smoothly, due to the smart allocation of resources. Also, having all relevant government institutions on board proved to be beneficial when implementing the Water Act (Saleth and Dinar, 2005). The availability of resources and inclusivity of all relevant stakeholders are regarded as essential factors for the climate resilience.

In a study conducted in Sydney, Australia, results show that the policies of the upper government level determine the coping mechanisms and, the tasks of local institutions in addressing the phenomena (Measham et al., 2011). In this part of the world, adaptation is considered a local government activity, with some facilitation or support from higher level institutions (Huitema et al., 2016). However, local institutions commonly lack resources for climate change adaptation (Swalheim and Dodman, 2008). Thus, the Australian government established several initiatives for climate resilience in local institutions (Measham et al., 2011). The Local Adaptation Pathways Programme (LAPP) is one such program and, its main mandate is to provide funding to local institutions for the development of coping mechanism plans and risk assessments (Baker et al., 2012). This is important as, in most cases, policy framework for climate resilience in municipalities is in place, but funds for the implementation are not available. Therefore, the LAPP is an important program for execution of climate resilience plans at municipal level in Australia.

The Bangladesh national government has a similar program, whereby it provides local institutions with funds for climate resilience (Stringer et al., 2009). A relationship between different spheres of government is essential for the success of climate resilience. Since the phenomena is already manifesting in Bangladesh, national government (with the assistance of development partners) has invested more than 10 billion US dollars in national risk management projects, such as, cyclone and flood shelters, and upgrading infrastructure

(Stringer et al., 2009; Sovacool et al., 2012). Institutions such as the Bangladesh Climate Change Trust Fund are funded by the government, while government, on the other hand, is funded by international donors. Such institutional bodies are responsible for putting climate change adaptive measures in place (Islam and Nursey-Bray, 2017). This is a good example of the Islam and Nursery-Bray (2017) statement, that formal institutions are crucial for purposive adaptation and bridging the gap between communities and external interventions. In view of this, without formal institutions, the effective climate resilience will be minimal in Bangladesh. Therefore, it is crucial to ensure that these institutions are in a good state.

Islam and Nursey-Bray (2017) explain that at national government level, Bangladesh has developed and implemented the National Adaptation Program Action (NAPA), together with the Bangladesh Climate Change Strategy and Action Plan (BCCSAP). The Ministry of Environment and Forests is responsible for climate change related activities. After consultation with different stakeholders, this department decided on afforestation as coping mechanism of choice in the coastal districts of the country (Sovacool et al., 2012; Islam and Nursey-Bray, 2017). Nature-based climate change intervention is considered as economical and effective, particularly if it is part of institutional climate resilience plan. Despite the struggles, the importance of the state organisations for climate resilience in Bangladesh is highlighted in some studies (Islam and Nursey-Bray, 2017). In consideration of this, there is a need to strengthen, evaluate, and monitor the institutional coping ability of municipalities in the country, as the key to success of community's climate resilience.

Not only Bangladesh, but most of Asia, is ensuring that its economies and lifestyles are climate resilient (Sovacool et al., 2012). For instance, the livelihoods of the Tibetan Plateau (China) communities are highly dependent on pastoral production. The viability of agriculture in the Tibetan Plateau is, however, unsafe because of the plight of varying climate patterns. The Chinese government uses a top-down methodology for policy development and implementation. The state has developed the China National Climate Change Programme (CNCCP) as a guideline for climate resilience. The CNCCP, in collaboration with provincial plans for the Tibetan Plateau, guide actions of climate resilience (Fu et al., 2012). Gongna, a heavy snow disaster (which prevents grazing for a month) is the most disastrous climate risk for pastoral production in this region. Funding for infrastructure, as provided by central government, is imperative for adaptation strategies. However, government institutions need to provide more assistance (like early weather warning systems) for pastoralists to cope with climate change threats such as Gongna (Fu et al., 2012). Although the government is providing

some assistance in this region, additional adaptation support is required to increase climate resilience of the pastoral production. This indicates that the funds from the global climate finance system are yet to reach all regions that are in need.

Nepal is another Asian country that is experiencing effects of varying climate. In response, Nepal has invested efforts into climate resilience. According to Nightingale (2017), Nepal's recent history is characterised by political instability, change and heavy foreign donor investments. Climate variation is viewed as one a major challenge for develop in this Asian nation. Furthermore, climate change adaptation was viewed as a risk reduction response early on in this country (Regmi and Bhandari, 2013). Thus, with the assistance of the United Framework Convention on Climate Change (UNFCCC), this country established a NAPA in 2010 (Nagoda and Nightingale, 2017). Coordination and execution of climate resilience related activities are tasks of the Department of Science, Technology and Environment. Nonetheless, Regmi and Bhandari (2013) discovered that there is a lack of systematic processes, skills, and technology for coping mechanisms in Nepal. A lack of institutional capacity is identified as a major barrier for successful climate resilience in this country. In addition, there is a lack of coordination; for instance, the Science, Technology and Environment Department has no direct linkage to district or local institutions (Nagoda and Nightingale, 2017). Therefore, although climate change adaptation amongst government institutions exists, it is fragmented. Lack of institutional adaptive capacity and fragmented efforts amongst government institutions are accepted as major challenges for climate resilience in this region.

Climate change effects compelled the government to declare glacier lakes as potential triggers of floods in Nepal. In response to glacier lakes, the government (with the assistance of donors) made investments into the drainage of water from one of the glacier lakes, the Tsho Rolpa Glacier Lake. However, there are more than 20 glacier lakes that need draining in Nepal, as they are all potential flood risks. Unfortunately, the government has financial constraints to perfom the necessary assignment (Regmi and Bhandari, 2013). Consequently, although there are some preventative measures in place for the potential flood risk posed glacier lakes, they are not sufficient to cover all glacier lakes due to a lack of financial capacity. Potential flood risks that are not prevented can result in devastating disasters. Therefore, it is necessary for the government to prioritise climate risk management measures to prevent disasters that can result in major economic, social, and environmental impacts.

Lack of knowledge, clear strategies, and policy vision at all levels are other barriers of climate resilience in Nepal. The success of coping mechanisms in Nepal will only be a reality if policy and practices are restructured to consider climate resilience (Regmi and Bhandari, 2013; Nagoda and Nightingale, 2017). Therefore, according to Nagoda and Nightingale (2017), the history of the country's institutional development, socio-political exclusion, weak administrative capacity, and a lack of clear responsibility, are other barriers to climate resilience in Nepal. One of the findings from the study by Nogoda and Nightingale (2017) reveals that; although there are many Non-Profit Organisations (NGOs) addressing challenges of climate resilience in Nepal, the NGOs are working in isolation from each other, and the district government officials do not have authority over these organisations. Instead, district government officials are only tasked with the coordination of NGOs. In view of this, the input through consultation of all stakeholders is key for the success of climate resilience. Therefore, the NGOs should ensure that they collaborate with government institutions for the betterment of adaptation plans and actions in Nepal.

Canada is also experiencing the impacts of varying change (Council of Australian Government (COAG), 2005). Melting permafrost, floods, droughts, and forest fires are signs of variability of climate in Canada. In 2002, Canadian national and local government institutions developed the National Adaptation Framework (NAF). NAF discovers options to enhance the coping mechanism of government institutions, reduce related risks, and identify opportunities that emerge because of varying climate change. The Canadian Environmental Assessment Agency produced a guideline document titled 'Incorporating Climate Change Considerations in Environmental Assessment'. This document has practical approaches of identifying the threats posed by climate change on new and existing developments (COAG, 2005). In contrast, Canada is still struggling to cope with varying climate. In consideration of this, it is important to examine the shortcomings of the policy framework for climate resilience in the country.

In the United States of America, factors influencing adaptation policy are less researched than contributors to mitigation policy (Singh et al., 2017). This indicates that mitigation has been a more preferred option than adaptation in combating climate change in this region. In 2011, the White House Council on Environmental Quality (CEQ) defined how federal agencies can help and support stakeholders at all scales of government, to address climate adaptation. Quay (2010) claims that some institutions of the United State of America, such as Denver Water, New York City (NYC) and City of Phoenix, opted for anticipatory governance as a means of combating climate change. All these institutions developed a decision framework for

implementing adaptation strategies that are founded on climate change monitoring. Since 2004, New York City, through its Department of Environmental Protection, has established a Climate Change Task Force unit to study how the water infrastructure in the city can be climate resilient. Subsequently, in 2008, an Assessment and Action Plan was developed. The plan consists of coping strategies for water management, mainly wastewater and flood management (Quay, 2010). However, the city has been adversely affected by flooding in recent times, therefore, the adaptation measures in place for climate change impacts are not sufficient or adequate.

Variability in climate is a scientific and governance matter (Corry and Jørgensen, 2015). Thus, Measham and others (2011), state that political influence affects adaptation to climate change. For example, according to Oreskes (2004), there is a belief amongst some policymakers and media (especially in the USA) that climate science is highly uncertain. Uncertainty and unpredictability are the main features of the challenges accompanying climate change adaptation (Meijerink and Stiller, 2013; Regmi and Bhandari, 2013). Numerous ministers, as well as the former leader of the USA, President Trump, are voicing concerns about the central tenets of climate science and opposing opinions may result in a noticeable risk that environmental policy will be less science-based in the years to come (Bjornberg et al, 2017). The immense influence of politics in the climate change field is evident. Anticipatory adaptation amidst uncertainties is necessary to build climate resilience for all economic, social, and environmental aspects of life. Therefore, coping with varying climate in the middle of uncertainties is part of governance.

Governance is a complex assignment due to phenomena being a cross-cutting sector issue. Climate resilience is moulded in an arena of different and often conflicting interests (Artur and Hilhorst, 2012; Regmi and Bhandari, 2013). Thus, the perception of stakeholders plays an essential role during climate change adaptation decision making (Koch et al., 2007; Simatele, 2010; Roberts, 2010; Artur and Hilhorst, 2012). The core of the political system is power, whereas in the economic system it is money. In the scientific system, on the other hand, knowledge is the principal object (Corry and Jørgensen, 2015). Therefore, decision makers from different disciplines are unlikely to pull to one direction since their different entities have different agendas and objectives on climate resilience. This would probably hinder the adaptation process. The current traditional mentality of the policymakers, planners and practitioners need to change significantly to integrate multi-stakeholder efforts in practices (Regmi and Bhandari, 2013). This can be achieved by institutional reform, as it changes the institutional settings and, subsequently, that might change the mind-set of policymakers.

2.5 Contextualising the Literature on Institutional adaptation to Climate Change: A Sub-Saharan Context

Aron (2000) indicates that most of Sub-Saharan Africa's population is poor, due to weak public and private institutional frameworks. There are several reasons that may result in weak institutional frameworks, such as: the absence of rules in an institution, ineffective rules that may be applied, or useful rules that may be poorly enforced. Chong and Gradstein (2007) claim that countries with poor quality institutions are characterised by high inequality gap. High levels of inequality are a common feature in most countries of Sub-Saharan Africa. Institutional quality in developing countries can drastically decline due to political instability, terms of trade or climate shocks (Aron, 2000). For example, weak domestic institutions in the region were not able to withstand the impact of oil price increases in the 1970s. As a result, economic growth was halted sharply (Rodrik and Subramanian, 2003). Moreover, climate change adaptation of a region or country is dependent on the sensitivity of the institutions (Artur and Hilhorst, 2012). In view of this, there is a clear relationship between the strength of institutions and the climate resilience of a region. Weak institutions have insufficient capacity to adequately safeguard communities from the climatic catastrophes.

Researchers argue that the climate impacts are felt mostly by underdeveloped nations due to limited financial and infrastructural capacity and, an over reliance on climate change dependent resources (Adams, 1998; Halsnaes and Verhagen, 2007; St. Clair and Lynch, 2010; Mcsweeney et al, 2010; Thathsarani and Gunaratne, 2018). Similarly, Africa is susceptible to impacts of varying climate, especially the Sub-Saharan African region (Wilk et al, 2013; Berhanu and Wolde, 2019), due to high reliance on natural resources (Boko et al., 2007; Ayers and Huq, 2009, Simatele, 2010; Abdul-Razak and Kruse, 2017), limited resources and low adaptive capacity (Haider, 2019). Additionally, other scholars argue that the menace of varying climate land at a period of rapid progress for most economies in Sub-Saharan Africa (Pardoe et al., 2018). Thus, researchers argue that climate resilience in the region is no longer considered a long-term objective, but a current necessity (Kom et al., 2020; Sibiya et al., 2022).

Nightingale (2017) articulated the significance of understanding political dynamics in the climate resilience discipline. Measham and others (2011), argue that the lack of resources tends to force local government to prioritise short-term goals. In contrast, other scholars argue that due to short-term cycles of elected government and the need to show results, immediate

development priorities such as poverty eradication and access to clean energy and water are prioritized over climate resilience issues in underdeveloped regions (Halsnaes and Verhagen, 2007; Pasquini and Shearing, 2014). Similarly, Dannevig et al., (2013) argue that, in the developing world, adaptive actions are delayed since climate change impacts are perceived as future events, hence, policymakers at a local level usually prioritise other socioeconomic challenges above climate change adaptation. Hence, Sovacool et al., (2012) argue that adaptation actions that result in direct benefits to local population are more politically acceptable. In assertion of this view, Pasquini and Shearing (2014) argue that political influence has a direct impact over local government mandates and tasks like service delivery and climate resilience. In consideration of this, climate change governance takes place in the political environment; therefore, the success of adaptation actions is dependent on the political support, particularly at municipal level.

Local government is responsible for all locally incurring tasks and has a mandate of decision making and providing service delivery (Kuhlmann and Wollmann, 2011). At local level, climate resilience competes with other needs of the community, for instance, electricity supply and building community facilities (Measham et al, 2011). Therefore, the varying climate impacts land on an already complex social setting with limited resources (Ndebele-Murisa, et al., 2020; Thomas et al., 2019). This notion indicates that climate resilience is perceived as a competitor of pressing socioeconomic issues for resources at local government level, instead of an ally in addressing these pressing challenges. In view of this, there is a need for sufficient and adequate knowledge and information about climate resilience at municipal level.

Agrawal (2008) argues that semi-arid and arid regions, such as Sub-Saharan Africa, require great institutional reforms if these regions are to be climate resilient. According to Heyns (2005), institutional reforms in the developing world usually fail because of insufficient human and financial capacity. It has been discovered that although developing countries may have suitable local adaptation plans and strategies, however, many local government institutions lack the capacity to successfully implement those plans (Pasquini et al., 2015). For instance, developing countries have introduced environmental policies and regulations to tackle serious environmental issues such as climate change (Xie and Saltzman, 2000), however, African cities struggle to successfully adapt due to insufficient capacity and unclear roles for addressing climate change within the institutions. (Aylett, 2015). In view of this, institutional changes are necessary in the region to address capacity challenges and ensure that the institutions and department's climate resilience related tasks are clear.

Jones et al., (2010) argue climate coping mechanism in developing countries has been on a spotlight in recent years. Similarly, Sokona et al., (2021) opined that climate resilience is part of the political programme in most African governments. For example, according to Simatele (2010), in Zambia, the institution that is tasked for the facilitation and coordination of environmental affairs (including climate resilience) is called the Ministry of Lands, Natural Resources and Environmental Protection (MLNREP), previously known as Ministry of Tourism, Environment and National Resources (MTENR). In 2009, the Zambia Climate Change Facilitation Unit (ZCCFU) was established within MLNREP and, this unit was tasked with the development of the climate resilience policy framework for Zambia. One of the challenges that hinder successful adaptation in Zambia are the fragmented adaptation strategies within different institutions. Fragmentation creates a situation where different institutions compete for national government budget allocation (Simatele, 2010). In view of this, although climate change is high on the political agendas of African countries, fragmented adaptation strategies among different government institutions is still a challenge. Hence, Agrawal (2008) claims that institutional partnership is important for successful adaptation at a local level. In view of this, climate coping mechanism is more effective when all relevant stakeholders eliminate fragmentation and contradiction by coordinating with each other for a common goal.

Zambia not the only nation that is struggling with fragmented institutional response to varying climate within the region. In a study that took place in Cameroon in 2008, the results show that government institutions at different levels address climate change in silos (Brown and Sonwa, 2015). Therefore, the challenge of fragmented coping mechanisms is common in the Sub-Saharan Africa. Moreover, the rural communities in Cameroon are already experiencing climate change; however, local institutions do not know how to respond to the impacts (Brown and Sonwa, 2015). This is a clear indication that, as important as the local institutions are to climate change, in some regions, these authorities are not equipped for climate resilience. In view of this, it is essential to ensure that municipalities in the region have the knowledge and information, and financial and human capacity for climate resilience. In addition, it is also necessary to establish coordination networks among organisations that are tasked with climate resilience.

Mozambique is also institutionally building its climate coping mechanism. The government of Mozambique developed a policy framework for climate resilience. The disaster risk management is a critical part of its climate resilience plan (Artur and Hilhorst, 2012). The

Ministry of Coordination of Environmental Action (MICOA) is tasked with the coordination and regulation of climate resilience related activities. However, Mozambique is among the least developed countries in the world, and is highly susceptible to natural disasters. Subsequently, climate resilience is competing for financial resources with socioeconomic necessities such as development and poverty eradication within government (Artur and Hilhorst, 2012). In view of this, in Sub-Saharan Africa region, climate resilience should be presented as one of the ways to solve pressing challenges such as unemployment and poverty eradication, as it is usually seen as a competitor for resources within government institutions.

The 2021 German watch's Global Climate Risk ranked Mozambique 1st in the world's most affected countries, yet it is ranked 32nd in relation to climate finance funds received (Mutizwa, 2023). This highlights the flaws of the current global climate finance framework. There are several international adaptation programmes that fund climate resilience and natural risk management in Mozambique. The Global Environmental Facility (GEF), MDG-F Spain and the United Nations Development Programme (UNDP) are financially supporting climate resilience in different countries. The GEF has voluntarily donated $180 million to support 45 adaptation projects in 33 countries so far (Sovacool et al., 2012), including Mozambique based adaptation projects. Different government institutions have all claimed that climate change adaptation falls under their portfolio, and this has created competition between departments, all pursuing partnership with international funding programmes (Artur and Hilhorst, 2012). This highlights the general poor state of the institution's capacity, because, if the general capacity was sufficient, there would be no need for different departments of the same government to compete for resources provided by the international donors. Multiple applications for funding within one government indicates that in Mozambique, as with Zambia, government institutions are fragmented in climate resilience. Koop et al. (2017), state that integration is necessary whenever scopes are fragmented. Thus, climate change adaptation requires coordination from different actors, sectors, and spheres of government (Meijerink and Stiller, 2013).

Zimbabwe is also experiencing the effects of varying climatic patterns. Impressively, Zimbabwe also has various adaptation strategies in place. There are several units which are tasked with different climate change related responsibilities in Zimbabwe. The Zimbabwean government established a National Climate Change Office within the Ministry of Environment. This office is supported financially by UNDP and, is responsible for engaging with UNFCCC,

since Zimbabwe is an active member of this international climate change body. The office is also tasked public relations duties concerning any climate related information (Dodman and Miltling, 2015). Another unit that is tasked with climate variation duties is the Zimbabwean National Climate Change Task Team. It is responsible for creating the National Climate Change Response Strategy and the National Climate Plan. Unfortunately, climate related funding, though extremely limited, is coming from outside the country (Dodman and Miltling, 2015). The 2021 German watch's Global Climate Risk ranked Zimbabwe 2nd in the world's most affected countries and is ranked 108th in relation to climate finance funds received (Mutizwa, 2023). In view of this, the current global climate finance system has weaknesses that need to be addressed to ensure that highly susceptible countries are prioritized accordingly in climate funding.

The National Climate Change Steering Committee consists of government and civil society individuals in Zimbabwe. This committee is tasked with guiding the production of the national climate resilience strategy (Dodman and Miltling, 2015). The involvement of many government institutions, with a vast difference in budget allocation for different units, has resulted in competition and tension amongst different ministries. The ministries responsible for the economy (economic planning and enterprises) and the ministries responsible for the environment (water and agriculture), both believe that climate change falls under their scope and that they should oversee the allocated resources for addressing climate change (Dodman and Miltling, 2015). Subsequently, like other parts of the Sub-Saharan Africa, the competition for resources between ministries of government has resulted in fragmented institutional climate change adaptation in Zimbabwe.

As part of Sub-Saharan Africa, Tanzania, as with other African countries, is vulnerable to an ever-changing climate. In Tanzania, the Division of Environment (DoE), which is situated in the Vice President's Office (VPO), is the custodian of the national climate policy (Pardoe et al., 2018). The positioning of this department within the government structure is respectable, as it is within a powerful office. The DoE is tasked with guiding the incorporation of climate resilience into domestic strategies and plans. The Tanzanian government published its NAPA in 2007. Although the NAPA was useful in encouraging the mainstreaming of climate resilience in Tanzania, the sectoral strategies are fragmented (Pardoe et al., 2018). In view of this, there is a need to address the common challenge of isolated approaches when different government institutions implementing their climate coping mechanisms in Sub-Saharan Africa.

There are several studies that investigated the climate resilience of institutions in the region. For instance, Kashaigili et al., (2009), examined climate resilience of the Tanzanian government, particularly the management of freshwater from the Great Rauha River catchment (GRRC). This body of work uncovered the prominence of enhancing the coping ability of the municipalities since national government has limited reach. The proximity to communities is one of the factors that make local government institutions important for climate change adaption. The other finding of the study points out that UNFCCC processes have no influence on how the Tanzanian government manages freshwater from the GRRC (Kashaigili et al., 2009). Pardoe et al., (2018) argue that even though the Tanzanian government signed the Paris Agreement, it has yet to renew it. The disconnection between UNFCCC processes and climate coping mechanisms of the Tanzanian government may be the result of a lack of coordination or incompatible processes of the UNFCCC in the Tanzanian context. Effects of varying climate are localised, therefore, the adaptation actions will be context specific, hence, the UNFCCC processes should not be viewed as universally appropriate.

In another research, Jones et al., (2019), studied lessons learned from the Africa Climate Change Resilience Alliance (ACCRA) programme. The ACCRA is a multi-stakeholder association consisting of four large international non-governmental institutes and a research organisation (Jones et al., 2019). From 2009 to 2013, the ACCRA programme research used the Local Adaptive Capacity (LAC) to study the impact of development interventions on levels of coping ability at community and household levels in eight districts across Ethiopia, Uganda, and Mozambique. Assets, institutions and entitlement, knowledge and information, innovation, flexible and forward-looking decision making and governance were chosen as determinants of coping ability to varying climate in the study. One of the study outcomes showed that the determinants were interdependent. The findings also showed that the framework's future success is dependent on ensuring that it is tailor made for the specific needs of the region. This view is in consensus with the concept that climate resilience is a local task due to localisation effects of varying climate.

Furthermore, Abdul-Razak and Kruse (2017) researched the characterisation of the coping mechanisms of the smallholder farmers in Ghana. Economic resources, social capital, awareness and training, technology, and infrastructure and institutions were the chosen determinants for this study. The selection of determinants is subjective because the coping ability is context specific. The results showed that the training and awareness, economic resources and technological capacities were seen as the most important for enhancing climate

resilience of the smallholder farmers. The results also indicated that the participants have low adaptive capacity (Abdul-Razak and Kruse, 2017). In view of this, agricultural industry is highly susceptible to varying climate, particularly rain-fed farming, due to high exposure to impacts of varying climate, irrespective of the resources at farmer's disposal. Therefore, it is expected for smallholder farmers in underdeveloped nations to have a low coping ability to climate change.

Other researchers investigated the relationship between governance and coping ability in Mali and Burkina Faso (Brockhaus et al., 2012). The study characterised and assessed the effects of a set of variables and indicators of institutional flexibility, individual and organisational understanding, and perceptions. Technical, financial, social, institutional, and political resources were identified as the key determinants. In another case, the Namibian national government tried a standardised approach for climate resilience at local level; however, that resulted in maladaptation due to the lack of municipal perspective (Fila et al., 2023). In view of this, it can be argued that adaptation responses and determinants of coping ability are both contexts specific. Therefore, chances of flaws are high in a one size fit all approach for climate resilience. Similarly, a one size fit all approach to assess adaptive capacity is likely to be unsound.

2.6 Contextualising the Literature on Institutions Adaptation to Climate Change: a South African Context

Biesbroek (2021) argues that each country has a distinctive socio-administrative system which has a specific approach of operating. In 1948, Apartheid was enacted and institutionalized as law in South Africa (Arya and Zhang, 2009). The Apartheid system created inequality along racial lines, where one racial group had access to land ownership, good education, and business opportunities, whilst other races were denied such privileges. As a result, the South African institutional environment was coercive and oppressive until 1994 (Arya and Zhang, 2009). South Africa held its first democratic election in 1994. The newly elected democratic government had, as its core mission, the rectifying of Apartheid's unjust legacy. Some researchers are concerned that climate change adaptation may be shaped by the legacy of apartheid and the resulting inequalities of society in South Africa (Chersich et al., 2018). Thus, other researchers argue that, due to the history of South Africa, chosen climate change

adaptation measures should not hinder service delivery, but should allow development and create economic opportunities (Cartwright et al., 2013).

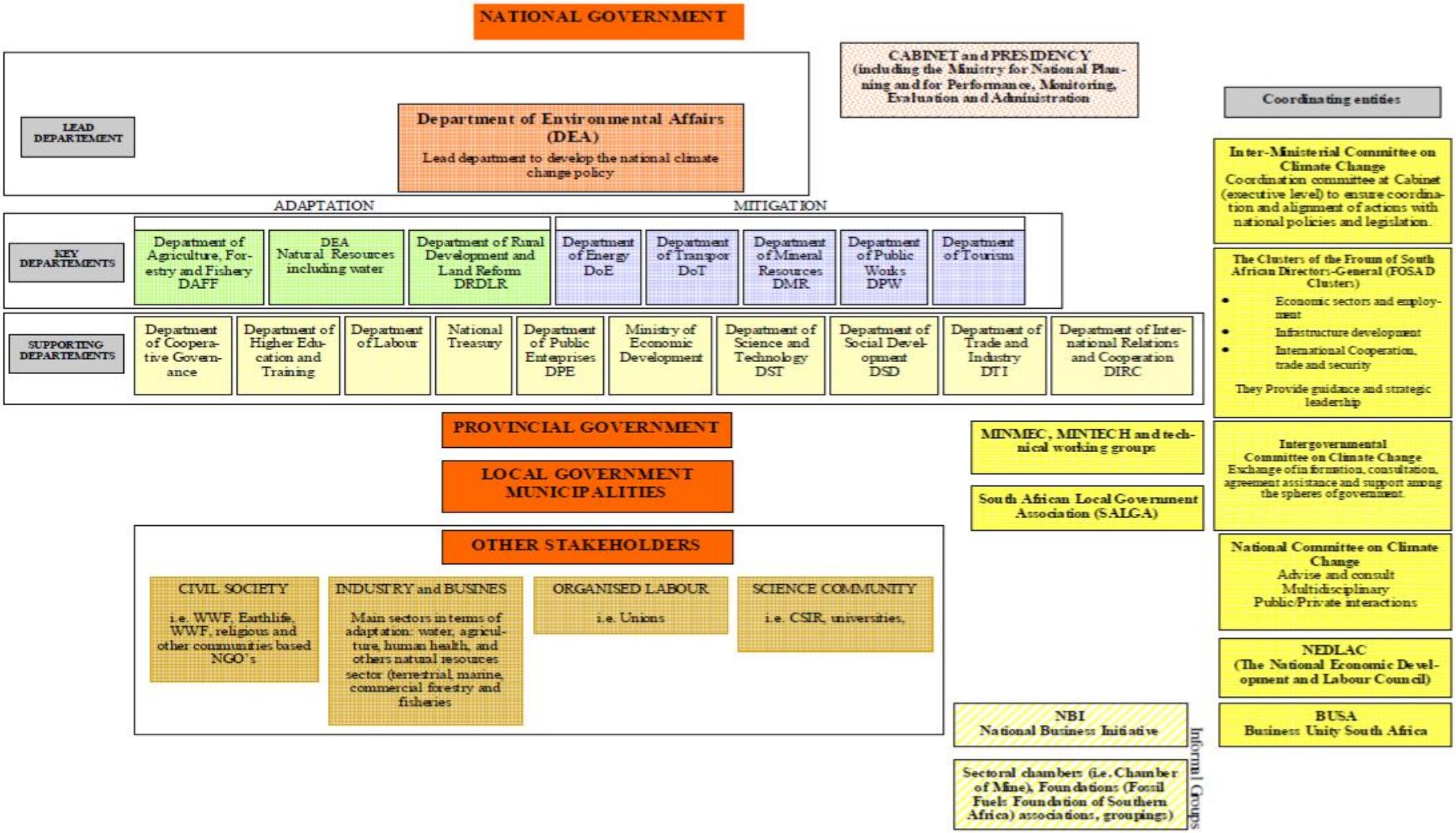
Since 1994, South Africa went through intense reform programs for social, economic, and political reconstruction, with the aim of redressing past socio-economic imbalances (Saleth and Dinar, 2005; Backeberg, 2005). Institutional reform in South Africa has created a hierarchy of three levels of decision making: operational, institutional and policy levels. Therefore, for any effective institutional reform to occur in the country, all three levels of decision making must be considered. The post-apartheid government brought forth a new constitution, which then became the foundation of institutional reform programs in the country. The major policy and institutional changes in South Africa have been driven by a mixture of political, economic, social, and natural events (Backeberg, 2005). In view of this, institutional reforms that can accommodate climate resilience are necessary, as the economic development gains of the post-apartheid government are under threat from varying climate.

The South African state acknowledges the need for climate resilience (Elum et al., 2017), and appears to be fully active in combating it (Nkhonjera et al., 2017). Hickmann and Stehle (2019) argue that the environmental policy is constitutionally defined as a responsibility of both the national and provincial levels of government in South Africa. In contrast, others argue that all spheres of government are essential for climate resilience, both from developing strategies and coordinating the adaptation process (Montmasson-Clair and Zwane, 2016). Similarly, others acknowledge the increased recognition of varying climate at all spheres of South African government in recent years (Leck and Simon, 2018). The government has established policies, strategies and plans for mitigation and resilience to varying climate (Chersich and Wright, 2019). Ziervogel and others (2014) opined that numerous government departments across all three levels of government have developed climate change strategies and/or plans.

According to Averchenkova and others (2019), the national climate change governance of South Africa has evolved in terms of policies, strategies and plans for almost three decades. The South African National Climate Change Response Strategy (NCCRS) was published in 2004, with the objective of incorporating climate change response programs across national and provincial boundaries (Koch et al., 2007; Carmin et al., 2012). It was followed by the NCCR White Paper in 2011 (Godsmark et al., 2019). Additionally, since 2012, climate change has been part of the overarching plan for the country, the National Development Plan (Averchenkova et al., 2019).

The NCCR outlines the national government's responsibilities in decreasing emissions of greenhouse gases and building climate resilience (Godsmark et al., 2019). It serves as a guide for what is expected from government institutions and, also outlines what is needed by all provinces and municipalities to achieve the goals it intends to attain (Ziervogel et al., 2014; Montmasson-Clair and Zwane, 2016). The NCCR provides guidelines for policy development and implementation for different terms (Leck and Simon, 2018). Among others, NCCR's objective is to adequately cope with calamities of varying climate through coping mechanism that enhance and sustain South Africa's climate resilience (DFFE, 2011). The government released a draft of the updated version of the NCCR in 2018. The improved version of the NCCR contains new ways through which climate change concerns can be incorporated within all sectors of government (Chersich and Wright, 2019). The other essential climate change adaptation document is the South African National Climate Change Adaptation Strategy. It is a reference point for all climate resilience activities in the country (Chersich and Wright, 2019). The strategy is the ten-year plan of government, describing the main strategic areas, with measurable outcomes. The strategy was developed to promote the integration and reflection of climate resilience in the government and private sector institutions (Chersich and Wright, 2019). Figure 2.2 below illustrates the institutional framework for climate change in the country.

Figure 2. 2 Institutional framework for climate change in South Africa.



Source: DEDEA (2011)

The state is divided into local, provincial, and national levels (Leck and Simon, 2018; Nhamo and Agyepong, 2019). South Africa is comprised of nine provinces, and all of them are mandated to develop their own climate change strategy (Godsmark et al., 2019). Nonetheless, Montmasson-Clair and Zwane, (2016), argue that the provincial institutions are at different stages of climate change adaption; for example, only the Western Cape, Gauteng, Eastern Cape and KwaZulu Natal have developed climate change response strategies. The provincial climate change response plans/ strategies in South Africa are illustrated in Table 2.1 below.

Table 2. 1 Provincial climate change response plans/ strategies in South Africa

PROVINCES WITH CLIMATE CHANGE RESPONSE PLAN	PROVINCES WITH NO CLIMATE CHANGE RESPONSE PLAN	BUDGET ALLOCATED	DEDICATED INSTITUTIONAL ARRANGEMENTS
✓ Western Cape climate change response framework for the agricultural sector ✓ Gauteng climate change response strategy ✓ Eastern Cape climate change response strategy ✓ KZN climate adaptation plan ✓ Limpopo Green Economy Plan	✓ Free State ✓ North West ✓ Mpumalanga ✓ Northern Cape	✓ Western Cape (minimal dedicated budget) ✓ KwaZulu-Natal (minimal dedicated budget)	✓ Western Cape ✓ KwaZulu-Natal

Source: Montmasson-Clair and Zwane (2016)

The Eastern Cape Provincial government developed the Eastern Cape Climate Change Response Strategy (ECCCRS) in 2011 (DEDEA, 2011). However, Santhia et al., (2018) argue that the ECCCRS's objective of eliminating fragmented sectoral-approaches in climate resilience has not been accomplished. The South African government acknowledges that municipalities are important for climate resilience (DFFE, 2011). In contrast, some scholars argue that local municipalities have a limited input in the development process of the national policy due to the political system in South Africa (Hickmann and Stehle, 2019). In view of this, to minimise implementation challenges, it is necessary to ensure that local government institutions, as implementation agencies, have the maximum input in the development of the national policy.

The local government of South Africa consists of metropolitan and district, which are further subdivided into local municipalities. Therefore, the South African district municipalities are comprised of several local municipalities (Leck and Simon, 2018). The Eastern Cape Province

is highly susceptible to climate change impacts. Thus, it is essential for municipal institutions in the province to plan for coping mechanisms (Santhia et al., 2018). In view of this, it is important for municipalities in the province to develop and implement the policy framework for climate resilience.

The South African climate change governance is shifting from policy planning to implementation (Averchenkova et al., 2019). The NCCR White Paper of 2011 provides short to medium and long-term guidelines for policy development and implementation (Leck and Simon, 2018). However, the country has limited experience of implementing long term coping mechanisms (Ziervogel et al., 2014), and that has exposed the challenges of governance and the need for their solutions (Averchenkova et al., 2019). There are climate resilience concerns in the country, and they are complex and multi-layered (Leck and Simon, 2018). As a result, researchers argue that local government institutions across the country are struggling to adapt to varying climate (Ziervogel et al., 2014; Averchenkova et al., 2019). In consideration of these views, climate resilience is a complex assignment at local government, particularly in countries that are experiencing economic development and socioeconomic challenges. In consideration of this, it is essential to examine, understand, and address the factors that affect the institutional adaptive capacity to climate change in municipalities.

Koch and other authors (2007), point out that a weak institutional network is one of the challenges for climate resilience in the country. Similarly, others sited the silo approach of government institutions as an issue in climate resilience (Averchenkova et al., 2019). Thus, some researchers argue that South African policy framework for climate resilience is disjointed and sector specific (Montmasson-Clair and Zwane, 2016; Santhia et al., 2018). In assertion of this view, Leck and Simon (2018) uncovered that the local government implemented many climate change programs without the adequate support from provincial and national leadership. Additionally, some researchers argue that it is concerning that climate change adaptation governance is not only fragmented between institutions, but it is also isolated in the municipalities of South Africa. According to Santhia et al., (2018), response activities to varying climate are isolated within the municipal environmental departments, although the phenomenon is a cross-sector challenge. It is a concern that a multi-sector challenge is situated in the department that lacks the authority to adequately address climate change (Ziervogel et al., 2014). Thus, some researchers argue that the institutional relationships, articulation, and access, are important factors for climate change adaptation (Agrawal and Perrin, 2009; Leck

and Simon, 2018). In view of this, it can be argued that institutions should not adapt to climate change in an isolated manner.

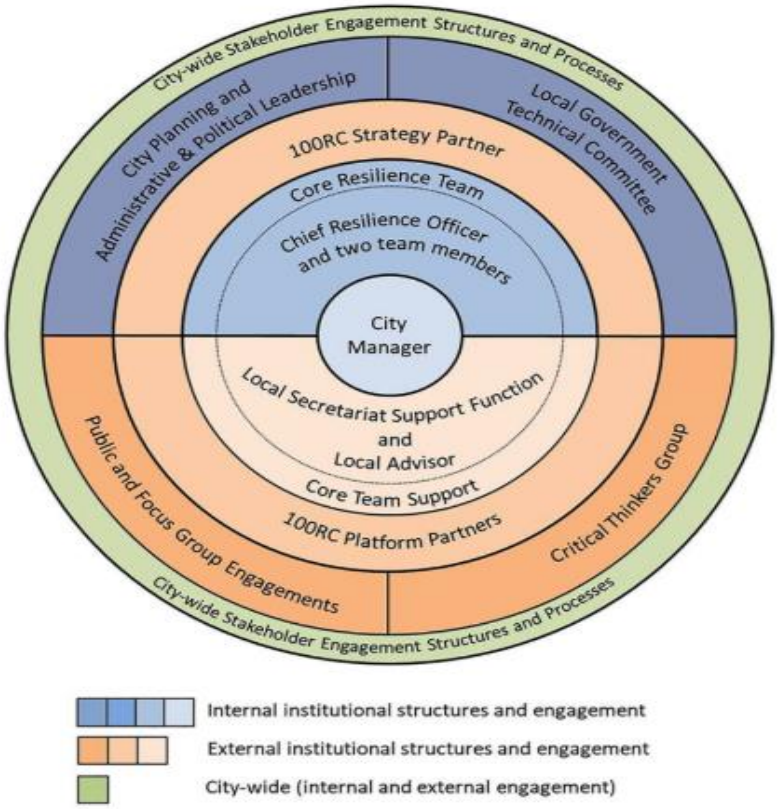
According to Ziervogel and others (2014), the insufficiency of human capacity is an issue in the smaller municipalities, and the classification of climate change as an unfunded mandate at the municipal level, are other concerns for climate resilience. Similarly, some researchers argue that insufficient financial and human capacity are a barrier for climate resilience in municipalities of South Africa (Faling et al., 2012, Rosendo et al., 2018). In assertion of this view, some researchers argue that these institutions struggle to successfully implement coping mechanisms due to insufficient resources (Swalheim and Dodman, 2008, Pasquini et al., 2013), and a deficiency of skills and expertise for climate resilience (Ziervogel et al., 2014; Averchenkova et al., 2019). In view of this, it is necessary to ensure that the local government institutions have sufficient resources to successfully develop and implement their policy for climate resilience.

Additionally, some researchers are certain that there is a need to address the insufficient knowledge and data about climate resilience at a local institutional level in South Africa (Popoola et al., 2020). Rosendo et al., (2018) argue that one of the repercussions of insufficient knowledge and information is poor climate change awareness, especially by decision-makers, within the municipalities. Hence, some researchers are of the view that there are coping mechanisms in the country, but there is insufficient political will to action them (Leck and Simon, 2018). In affirmation of this view, Faling et al., (2012) argue that there is low prioritisation for climate coping mechanisms in political and administrative decision making. Similarly, some researchers point out that coping mechanisms are currently a low priority in planning and budget allocation (Rosendo et al., 2018), and climate resilience is not one of the main factors used to assess the overall annual performance of local government institutions in the country (Pasquini et al., 2013). Nonetheless, politicians have the power to mandate municipal internal division to prioritize climate change (Pasquini et al., 2015). Similarly, according to Averchenkova and others (2019), the successful implementation of climate policy is dependent on the political commitment and coherent approach of government in South Africa. Regrettably, the phenomena is yet gain the needed political prominence (Leck and Simon, 2018). In view of all the institutional and capacity challenges, it is necessary for local government institutions to address all adaptation issues to enhance their climate resilience levels. To achieve this, it is necessary to introduce institutional reforms that can adjust the traditional institutional setting to accommodate climate coping mechanisms.

Although municipalities are struggling to be resilient, the country is experiencing rapid effects of varying climate. Subsequently, climate change related challenges are increasing daily at the South African local government level (Nhamo and Agyepong, 2019). For example, recent severe droughts caused water scarcity predicaments in the Cape Town, Western Cape Province (Dube et al., 2022). Ndebele-Murisa et al., (2020) argue that the drought in the Western Cape is more frequent, extensive and extreme, and it is caused by the low levels of rainfall. This drought induced water disaster was mostly apparent between 2016 and 2018 (Bigger and Millington, 2020). Some researchers argue that the local government capacity to respond to the drought was stretched to the limit (Simpson et al., 2021). Furthermore, others argue that the combating of the drought and water scarcity resulted in a municipal budgetary shortfall of an already limited budget (Bigger and Millington, 2020). It has further been argued that the recent drought in South Africa has affected the livelihood of many people and it has resulted in high economic loss (Ojo et al., 2021).

Another example is the recent floods that occurred in eThekwini, in the KwaZulu Natal Province. eThekwini is among global leading municipalities in institutional climate resilience at municipal level (Cartwright et al., 2013; Rosendo et al., 2018). Durban is part of eThekwini; thus, the city is among the best in climate resilience in Africa and beyond (Leck and Roberts, 2015). eThekwini set up a department to specifically develop, implement and coordinate climate coping mechanisms (Rosendo et al., 2018).

Figure 2.3 Climate change institutional framework of Durban.



Source: Roberts et al., (2020)

Nonetheless, this municipality has struggled to deal with recent heavy floods. In view of this, the struggles of eThekwini, which is a leader in climate resilience, is evidence that all local government institutions in the country are not resilient to effects of varying climate. Therefore, there is necessity to look at how to further enhance the institutional coping ability at municipal level, as the success of coping mechanisms is dependent on the institutional adaptive capacity.

2.7 Identifying the Gaps in Knowledge: A Synthesis

Adaptive capacity is viewed as an integral part of coping with climate variations (Maldonado-Mendez et al., 2022), and policymakers and academics have increasingly recognised the importance of capacity in climate resilience (Siders, 2019). However, most adaptive capacity research is conducted at household and community level in European and North American countries (Siders, 2019). Hence, Mikulewicz (2018) opined that there is limited research investigating climate coping mechanisms in the third world nations, particularly at the local

sphere. In addition, there are few studies that concentrate on evaluating the preparedness of local municipal institutions (Jones et al., 2010). In consideration of these views, there is a need for studies that investigates the evaluation of the institutional coping ability to varying climate in municipalities of the developing countries.

Hurlbert and Gupta, (2017) indicate that the increasing evidence of global warming requires all countries to increase their climate resilience. Similar to other developing countries, researchers argue that the improvement of the climate resilience is necessary in South Africa (Busayo and Kulumba, 2021). Even so, Mikulewicz (2018) argues that due to a high variety of adaptation issues and the context-specific nature of adaptive capacity, there is no single formula agreed upon for building adaptive capacity. Subsequently, there is a lack of consensus on the trajectory of climate resilience, particularly on how it should emerge and what the appropriate measures should be (Regmi and Bhandari; 2013). Similarly, other researchers indicate that there is no agreed-on metrics, techniques, framework, or indicators to measure climate resilience (Fu et al., 2012). In view of this, evaluation of the coping ability is a challenging process, and there is no agreement on the direction of climate resilience nor how to evaluate the coping ability for varying climatic conditions. This is evident in different theoretical frameworks that were developed by different researchers.

Some frameworks are based on the notion that poor populations are highly susceptible to the effects of the varying climate. For example, the asset-based vulnerability framework by Moser and Satterthwaite (2008) emphasizes the importance of assets in enhancing the coping mechanism of the communities that are highly susceptible to the phenomena. According to Moser and Sattertwaite (2008), the asset portfolio of an institution is a key determinant of the level of coping ability to varying climate. In contrast, Gupta and others (2010), and Grothmann and others (2013) argue that institutions are important in promoting the climate resilience of a society; however, they are traditionally conservative and reactive. Hence, there is a need for institutional redesign to proactively respond, through planned and deliberate changes, to varying change (Gupta et al., 2010). In view of this, these concepts complement each other, as they are both useful for enhancing institutional coping mechanism to climate variation. An increase in asset portfolio, through government and external funding, equates to an increase in financial, technological, and infrastructural capacity. Similarly, institutional reforms that will accommodate adaptation actions enhance the institution's preparedness for climate variation.

Therefore, both assets and institutional reforms can be the determinants of institutional coping ability for varying climate.

Climate change awareness is improving in the country, and there is progress in the implementation and evaluation of coping mechanisms (Ziervogel et al., 2014). The recent progress highlights the willingness of municipal institutions to combat climate change (Leck and Simon, 2018). However, as with other developing countries, South Africa is confronted by other socioeconomic and environment issues, besides the threat of the varying climate (Pasquini and Shearing, 2014). South African municipalities are responsible for local policies, development decisions, and resource allocations to drive the country's transformation mandate, which will ultimately influence local climate change adaptation prospects and barriers (Leck and Simon, 2018). Unfortunately, these institutions are struggling to achieve their developmental mandate because of political, institutional, and capacity issues (Pasquini et al., 2013; Pasquini and Shearing, 2014). As a result, varying climate land on an already complex social setting with limited resources (Thomas et al., 2019; Ndebele-Murisa, et al., 2020). Hence, some researchers allude that climate change generates new dynamics of governance in an already existing institutional setting in South Africa (Millington and Scheba, 2021). In view of this, it is crucial to introduce institutional changes that will promote climate resilience at local government level.

Olazabal et al., (2019) argue that it is critical to evaluate the sufficiency of the climate coping mechanisms. Tracking of adaptation progress is essential for governments at different spheres, particularly in developing countries, for effective planning and prioritising resources (Olazabal et al., 2019). Similarly, according to Juhola and Kruse (2015), coping ability assessment provides crucial information in development of policy framework for adaptation and climate resilience at all levels of the state. Thus, policymakers and researchers have prioritised the task of finding a reliable method to assess coping ability to varying climate. However, other scholars point out that assessment of the coping ability to varying climate is a difficult assignment (Hogarth and Wojcik, 2016; Patterson and Huitema, 2019). There are a couple of studies that focus on the evaluation of the preparedness for climate variation that were conducted in South Africa; for instance, adaptive capacity to water stress trends at the local level in the Capricorn District, Limpopo Province (Mpandeli et al., 2019), adaptive capacity and coping strategies at forest-based rural communities in the Vhembe District, Limpopo Province (Ofoegbu et al., 2016), and measuring the determinants of coping mechanisms of farmers in different parts of the country (Ojo et al., 2021). Other researchers investigated struggles of climate change

adaptation at municipal level (Pasquini et al., 2013). What is missing in the literature is the research that investigates how to adequately evaluate and monitor the institutional adaptive capacity to climate change of local government institutions in South Africa.

2.8 Conclusion

The literature review was guided by the research questions. It presented literature about the policy framework for climate change at global, challenges of climate change adaptation at local government at global, Sub-Saharan Africa and South Africa level. The literature review also presented some of the frameworks that are applied to evaluate the adaptive capacity of climate change of institutions. The section also presented the gap in in literature for this study.

CHAPTER THREE
METHODOLOGICAL CONSIDERATION

3.1 Introduction

The methodology that was applied in the research is discussed in detail in this section. Methodology is a scientific approach which is implemented when conducting research (Jamshed, 2014; Nayak and Singh, 2015; Igwanagu, 2016). Igwanagu (2016) defines methodology as the organised and theoretical breakdown of the techniques used in the study. In essence, research methodology is a systematic pathway that details the ontology, epistemology, methods for data collection and analysis that the researcher used to address the research problem. A research methodology that replied to the research questions and addressed the study aims and goals was adopted. The study aimed to examine and understand the intricacies of climate change governance at municipal level in South Africa and, how they measure the coping ability of institutions. The research intended to shed light on how the climate policy framework promotes the institutional adaptive capacity, gain insight into the institutional and capacity dynamics of governance, and to understand the evaluation process of the coping ability of municipalities in South Africa.

In consideration of the above view, this chapter consists of several sections. It commences by the clarification of the philosophical positionality of the researcher. The following section is the research design; it describes the study site, explains the study population and sampling process, and details the data collection and analysis techniques that were applied. The chapter concludes with the methodological reflective.

3.2 Philosophical Position/ Research Approach

Some scholars argue that the researcher is the research tool and is connected to the techniques used in the study (Cousin, 2010; Bourke, 2014). Thus, Sutrisna (2009) argues that the philosophical stance of the researcher influences the reasoning of the research, the selection of data required and analysis of the data. Similarly, other scholars argue that the social categories like culture, class, religion, community, and natural surroundings influence the positionality of the researcher (Cousin, 2010; Hay, 2010). Thus, the perception and biasness are viewed as factors that may influence the research process (Cousin, 2010). Additionally, Hay (2010) points

out that the identity is moulded gradually as one develops through personal growth within a societal and natural context. Hence, Bourke (2014) is of the view that it is vital for the concept of self, as a research tool, to reflect on the chances that the researcher's own objectivity will show on the study and reporting of the findings.

There are several philosophical viewpoints that may influence a study; for example, ecocentrism, anthropocentrism, feminism and so forth. In this study, the researcher is influenced by ecocentric ideology. Researchers argue that this philosophy is ecosystem centred (Marcia and Simwela, 2019; Raj, 2022). It is a popular ideology amongst environmentalists (Humaida, 2020). Additionally, ecocentric view of the world has been around for centuries (Washington et al., 2017; Marcia and Simwela, 2019). However, from 1990s onwards, this philosophy has received great attention (Pires et al., 2014).

Ecocentrism is generally defined as a perspective that recognises the intrinsic values and rights of both human and non-human life (Washington et al., 2017). Additionally, this ideological position considers nature, ecosystems, and all livings things to have an intrinsic value, and worth apart from its usefulness to humankind (Kortenkamp and Moore, 2001; De Lucia, 2017; Washington et al., 2017; Gray et al., 2018; Kopnina, 2019; Marcia and Simwela, 2019; Zhang, 2019; Dickerson, 2020; Humaida, 2020; Rulke et al., 2020; Taylor et al., 2020). Hence, this school of thought advocates for the respect of non-human nature and that decisions about nature should not be based on human benefits (Marcia and Simwela, 2019; Humaida, 2020).

It has been argued that ecocentrism believes in the possibility of the harmonious co-evolution and co-existence of the natural and social world (Nekhamkin et al., 2018; Marcia and Simwela, 2019). Thus, scholars argue that ecocentrism is an inclusive perspective that recognises that human and natural system destinies are connected (Purser and Montouri, 1996; Washington et al., 2017). Similarly, other researchers argue that it is impossible to imagine man without nature, since humans are embedded in nature and supported by nature's elements (Raj, 2022). Similarly, other scholars concur that humans and non-humans are unequivocally dependent on the ecosystem processes that nature offers (Washington et al., 2017). Thus, some researchers argue that ecocentrism considers human needs secondary to those of the natural environment (Gray et al., 2018).

The ecocentric school of thought acknowledges that the greater part of the earth consists of non-human nature (Kopnina et al., 2018). Zhang (2019) argues that ecocentrism views humans as a species that has no right to destroy or deprive other species of the right to exist for their

own survival. Hence, Purser and Montouri (1996) argue that ecocentrism opposes the human arrogance and moral insensitivity towards the natural environment. Similarly, other scholars argue that this ideology is against the human's mastery over nature stance (Kopnina et al., 2018). Additionally, researchers argue that ecocentric action is a moral reasoning to act in benefit to the environment rather than that of humans (Donnelly and Bishop, 2007; Raj, 2022). Similarly, other scholars argue that ecocentric action is driven by personal and social values to put environmental protection above human demands (Bailey and Wilson, 2009; Marcia and Simwela, 2019; Raj, 2022).

Nevertheless, ecocentrism is not a philosophy that is against humans (Marcia and Simwela, 2019). This philosophy understands that humans are important for future of the ecosphere (Marcia and Simwela, 2019; Piccolo et al., 2019). For example, currently, it is understood that humans are the only species that reflect and apply moral values on environmental related issues (Washington et al., 2017). Additionally, the ecocentric viewpoint understands that humans must use and exploit nature to survive; however, this philosophy highlights the issue of vague ethical boundaries between fair use and unsustainable use (Purser and Montouri, 1996; Kopnina et al., 2018; Nekhamkin et al., 2018). Furthermore, humans are not only part of the earth, they are also the main custodians of the environmental resources (Emetumah, 2017). However, any misuse and exploitation of environmental resources may lead to disruption of delicate ecosystems (Raj, 2022). Thus, ecocentrism is essential, as it advocates long-term environmental sustainability (Marcia and Simwela, 2019; Zhang, 2019; Humaida, 2020). Moreover, this philosophical approach promotes the protection of environment, even if it is not for the benefit of human beings (Donnelly and Bishop, 2007; Washington et al., 2017; Zhang, 2019; Humaida, 2020). Therefore, ecocentrism philosophy is based on the safeguard of the environment. Hence, it needs to be greatly promoted in environmental related academics (Humaida, 2020).

This school of thought considers that human and natural system destinies are entangled (Purser and Montouri, 1996; Washington et al., 2017). Climate change affects natural environment and has a domino effect on humankind's health and livelihoods. Hence, Donnelly and Bishop, (2007) assert that protection of the environment is beneficial for safeguarding the fundamental good of human life. However, the practical and political challenges of a transformation towards ecocentric climate adaptation are a known reality (Bailey and Wilson, 2009). Hence, econcetrism is a big challenge (Pires et al., 2014). Ecocentric based decisions tend to take time and are usually not easy to implement, especially for populations that are extremely reliant on

natural resources (Marcia and Simwela, 2019). Unlike, anthropocentrism, which is human centred and gives humans power over the non-human nature (Marica and Simwela, 2019; Rulke et al., 2020), ecocentrism is unlikely to be favoured by those who are less concerned about the non-human nature. This philosophy is useful for this study as it comprehends the entanglement between natural systems and human activities; in this case, the interconnection between climate change and local government institutions.

Ontology and epistemology are actually presenting a biggger picture on how the researcher percieves reality and how that can influence the research process (Sutrisna, 2009). Ontology is all about the nature of reality and epistemology is about knowledge (Nayak and Singh, 215). The study applied subjective, which states that reality depends on one's experience, perception and reality. It has been argued that epistemology is the theory of knowledge that inform the research, and it is an issential foundation for research in both natural and social science (Sutrisna, 2009; Nayak abd Singh, 215). In this study, the phenomenological approach was used. Husserl (1962) states that this approach focuses on the individual experiences, beliefs, and perceptions. Moreover, phenomenology is a science that aims to describe experience or the appearance of things as live experiences (Speziale et al., 2011). This approach was applied as the study seek to draw out experience and opinions about perception of evaluating institutional adaptive capacity.

3.3 Research Design

Research design is a framework of how the research will be executed (Nayak and Singh, 2015). It outlines the general procedure that the researcher chooses to combine different parts of the study in a consistent and coherent manner to adequately answer the research questions (Nayak and Singh, 2015; Mishra and Alok, 2017). As a result, the researcher must consider which methodologies and methods are best suitable to answer the research question during a research design (Gear et al., 2018). Thus, other scholars opine that a good research design is only achieved when the research problem is clearly stated (Mishra and Alok, 2022). Therefore, it ensures that the research questions are answered, and the study aims and objectives are achieved.

A suitable research design was chosen with a sole deliberation of responding to the research questions in a satisfactory manner. There are various research methodologies that are suitable

for different research problems, and are generally classified as quantitative, qualitative, or a mixed methods approach. Quantitative research is usually statistically driven. It tends to be based on descriptions and testing, or derived hypothesis (Mweshi, 2020). Quantitative research findings are determined from statistical techniques, correlations, and other mathematical calculations (Bowen, 2005). Mixed methods research applies both qualitative and quantitative approaches in one research. The technique provides statistically driven results and meaning to understand the research problem.

A qualitative approach is useful when applied in research that seeks to understand the views, experiences, and perspectives of participants about the subject of interest (Isaacs, 2014; Tuffour, 2017; Mohajan, 2018). Hence, Kielmann et al., (2012) argue that a qualitative research objective is to explain rather than describe. Qualitative research is useful to capture and understand complex prominent issues, especially those that fall under underexplored or unexplored areas (Jamshed, 2014; Isaacs, 2014; Tuffour, 2017; Gear et al., 2018). The approach is less concerned about statistics; however, numerical data should be included where available and appropriate (Bowen, 2005; Mohajan, 2018). Therefore, although qualitative approach is not statistically driven, its methods can collect and analyse suitable numerical data. In addition, the approach looks in-depth at non-numerical data, and this type of data is harder to analyse compared to quantitative data.

In consideration of the above views, the study interest was on the qualitative aspects of climate change governance, and is not statistically driven; thus, a qualitative approach was applied. A qualitative approach involving interviews and secondary data analysis was chosen to gain insights on municipal climate change governance in South Africa, particularly the measurement of institutional coping ability.

3.3.1 Description of Research Site

Researchers are required to reveal the details of the research site (Garg, 2016). The study site was the Eastern Cape Province of the South Africa. The province was one of the first areas settled by the Portuguese in 1488 and by the British in 1820 (StatsSA, 2022). It is situated in the south-eastern coastal area of the country. It is among the largest regions in the country as it covers approximately 170 000 square kilometres of land and has a coastline of about 800km. The Eastern Cape comprises of two metropolitan, and six district municipalities, which are

further subdivided into 29 local municipalities. A population of 7.2 million people reside in the province, and over 85 per cent are black Africans (StatsSA, 2022).

The province is among the poorest regions in the country. It has two former homelands, Transkei, and Ciskei, which were neglected for any development during the apartheid era. As a result, the province has high rates of emigration, inequality, poverty, illiteracy, joblessness, and rural population (DFFE, 2012; StatsSA, 2022). A high rate of households depends on the agricultural sector for food and livelihoods in the area. The agricultural sector of the Eastern Cape Province is dominated by forestry, marine farming, and a diverse range of crops and livestock farming (StatsSA, 2022). In addition, there are hundreds of game farms throughout the province.

Eight of the nine biomes of South Africa are present in this province (Walz et al., 2020). The diverse biodiversity of the province includes semi-arid, mountainous, forest, and coastal regions. As a result, the climate is diverse within the province; for instance, annual rainfall varies across different parts of the province. The weather of the interior of this province consists of high temperatures in summer and extremely cold winters (Muller and Shackleton, 2014). The weather of the coastal areas is influenced by the warm Agulhas Current. Low lying coastal areas experience high temperatures in winter compared to inland regions.

The susceptibility of the province to effects of varying climate is caused by the extreme reliance of the poor rural population on climate sensitive agricultural sector. The province is experiencing rising sea levels, a variation in rainy seasons, and frequent and intense droughts, heat waves, storms, and floods. The Eastern Cape Province has experienced frequent droughts in recent years. It was declared as one of the drought disasters afflicted provinces during the 2007/2008 and 2015/2016 droughts. The province is projected as one of the provinces that will suffer the most with drying runoffs due to climate change. In addition, inequality, poverty levels, food insecurity and losses of farm jobs (unemployment) has increased tremendously in this area, due to climate change impacts.

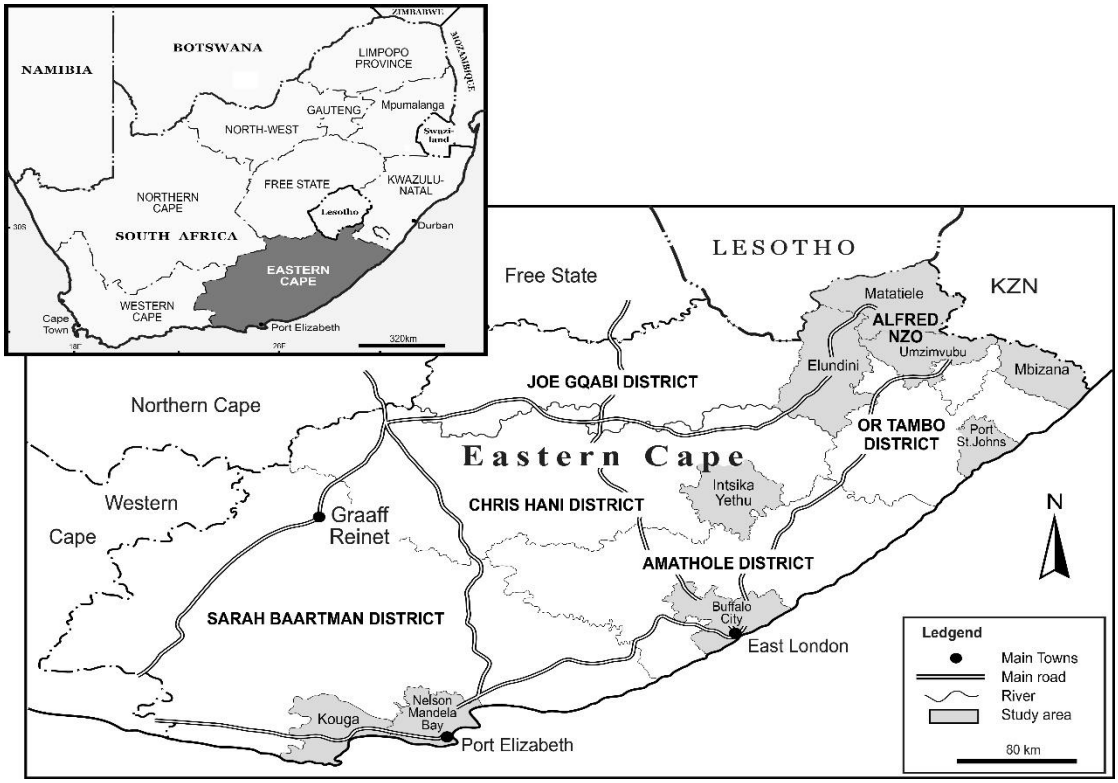


Figure 3. 1 Location of the study sites in the Eastern Cape Province, South Africa

Source: Cartography Unit, University of the Witwatersrand (2022)

3.3.2 Study population and sampling procedure

Adequate selection of the target population is vital in research (Nayak and Singh, 2015). Englander (2012) indicates that the first part of a data collection process is choosing the appropriate participants. In addition, Coyne (2008) opined that the purpose of the research guides the researcher in selecting the type of participants that will be appropriate for the study; for instance, their age, gender, occupation, or role in the institution. In the field of environmental governance, government institutions are considered to be essential players in combating environmental problems, like climate resilience (Beunen and Patterson, 2019). Hence, the study targeted the government sector, and relevant government's advisory institutions. The vital institutions for climate resilience in South Africa are presented on Table 3.1 below.

Table 3. 1 Key institutions for climate change adaptation in South Africa

Institution	Responsibility
Department of Forestry, Fisheries, and the Environment (DFFE)	Lead Department
Department of Water and Sanitation (DWS)	Key Department
Department of Agriculture, Land Reform and Rural Development (DALRRD)	Key Department
National Treasury	Supporting Department
Department of Higher Education and Training	Supporting Department
Department of Science and Innovation	Supporting Department
Provincial Government	
Local Government Municipalities	Implementing agencies
South African Local Government Association (SALGA)	Advisory to Municipalities
Industry and Business	Stakeholder
Civil Society	Stakeholder
Science Community	Stakeholder

Source: Based on Figure 2.2.

Garg (2016) indicates that it is usually infeasible to include all the target population in the study, hence, a sample of the population must be taken. A sample is a subcategory of a population, selected to represent a larger group in a study (Burns and Grove, 2003; Acharya et al, 2013; Nayak and Singh, 2015). The sample of the population was selected in accordance with the parameters of the study, which emphasised the local government level. The study engaged with national, provincial, and local government institutions presented in Table 3.2 below.

Table 3. 2 Research participants (institutions and number of respondents)

Institution	Number of respondents (N=46)	Respondent's role
Departments 1. Department of Forestry, Fisheries, and the Environment (DFFE)	2	1. Climate Change Adaptation Specialists
Provincial Governments 1. Eastern Cape Province 2. Limpopo Province	8	1. Disaster management officers 2. Environmental officers 3. Waste Management and Environmental Managers
Local Government institutions 1. Nelson Mandela Metropolitan Municipality 2. Buffalo City Metropolitan Municipality 3. Amathole District Municipality 4. Chris Hani District Municipality 5. Mbizana Local Municipality 6. Elundini Local Municipality 7. Ntsika Yethu Local Municipality 8. Port St. Johns Local Municipality 9. Matatiele Local Municipality 10. Mzimvubu Local Municipality 11. Kouga Local Municipality 12. Various Limpopo Municipalities (Polokwane Local Municipality, Lepelle-Nkumpi Local Municipality, Molemole Local Municipality, Blouberg Local Municipality, and Capricon District Municipality)	35	1. Biodiversity and Climate Change officer 2. Environmental officers 3. Environmental Managers 4. Disaster Management officers 5. Head of Community Services 6. Councillors
Advisors 1. South African Local Government Association (SALGA)	1	1. Climate Change Adaptation Specialist

Source: Based on field notes.

Table 3.2 illustrates that 46 respondents from 19 institutions were the source of primary data collection in the research. The study engaged with the specialised participants from key

institutions that could offer useful information and give in-depth context in the subject of interest. At national level, it was purposefully decided to work with technocrats from the DFFE, which is a department responsible for climate change governance in the country; and SALGA, which is an advisory institution for municipalities. At provincial level, the study engaged with technocrats and decision-makers from the Eastern Cape provincial government, and Limpopo provincial governments. In addition, at local level, the study engaged with technocrats and decision-makers from municipalities of the both provinces. It must be noted that the local government has three levels, metropolitans and districts, which are further subdivided into several local municipalities. Therefore, it was important to work with metropolitan, district and local municipalities for a broader view of climate resilience in municipalities of the Eastern Cape Province.

The province has two (2) metropolitan municipalities, six (6) district municipalities, and twenty- nine (29) local municipalities. Almost all 37 municipalities were sent a request to participate in the study; however, most of them did not reply at all, or turned down the invitation due to various reasons, ranging from climate change not being part of their mandate, to non-existence of climate change activities at the institution. As a result, the study engaged with two metropolitan, two district, and seven local municipalities. Therefore, out of the 37 local government institutions of the province, the study engaged with 11, which is about 30 per cent of the overall total. In addition, the DFFE, SALGA, the Limpopo Provincial Government, and several municipalities also participated in the study.

Based on the research questions, the study applied a purposive technique accompanied by a snowball method to choose the respondents. Informants are selected in a deliberate method; due to the qualities they possess (Etikan et al., 2016). Participants are chosen according to their knowledge and experience in the field of interest, and their willingness to share on it (Tongco, 2007; Etikan et al, 2016). The participants were comprised of climate resilience specialists, a biodiversity and climate change officer, a head of community services, environmental managers, disaster management officers, environmental officers, and councillors. To begin with, the institutions needed to agree to participate in the research. The first step was to call the reception to enquire about the process of acquiring approval to conduct research at the institution. The researcher was then referred to a Human Resource Officer or a Research Development Officer who, in turn, requested for the proposal, details of the study, and a description of an ideal participant. Hence, a snowball effect technique was applied. The researcher was then informed that the institution decided to participate in the study, pending

the approval of ethics clearance by the university. Upon approval, the officer referred the researcher to suitable respondents. Thus, a purposive sampling method was also applied in the study.

The participants chosen met the eligibility criteria set for the study. To qualify for inclusion in this study, the participants satisfied the following criteria:

i. Be an official at SALGA, DFFE, Eastern Province Provincial Government, Limpopo Provincial Government, or any Eastern Cape or Limpopo Municipalities.
ii. In addition to the above, be responsible for the development and/ or implementation of climate resilience policies.
iii. In cases where there were no climate resilience activities taking place in the municipality, the employees that are responsible for environmental management were interviewed.

The participants were given an opportunity to confirm or decline participating in this study. The information about the research was provided to the informants when they accepted the invitation to participate. Once the participants agreed to participate, the arrangements about the date, time and place for an interview were made, at the participant's convenience.

3.3.3 Data collection and instrumentation

Scholars define data collection methods as techniques used by researchers to gather evidence (Nayak and Singh, 2015; Igwanagu, 2016). The selection of research methods reflects the approach to tackling the research problem (Jamshed, 2014; Tuffour, 2017). Different methodologies have suitable data collection techniques to address the research problem and achieve the purpose of the studies. To get an insight into complexities of evaluation of capacity of the institution for climate resilience, primary and secondary data was collected. Data collection tools, appropriate for qualitative research, that were applied to gather data are discussed below.

a. Interviews

A qualitative approach method of interviews was applied to gather primary data. The interviews were semi-structured, in-depth, and open ended to shed light on the complications

of evaluation of institutional capacity for climate resilience. It has been argued that even though semi-structured interviews are time consuming, they are best for in-depth investigation (Bowen, 2005; Gill et al., 2008). Additionally, researchers argue that a semi-structured interview is flexible; the interviewer can adjust the sequence of questions and can add questions based on the context of the participant's responses (Nayak and Singh, 2015). Furthermore, scholars point out that and interview consists of closed-ended and open- ended questions and cover particular topics (Kielmann et al., 2012; Jamshed, 2014). To maximize the opportunity to obtain as much information as possible, the interviews for this study consisted of open-ended questions. Neuman (2007) states that open-ended questions are the best option when seeking an understanding of people's experiences and perspective.

Although physical interviews are more labour intensive compared to other techniques, they are still the most effective way of collecting high quality data. Nonetheless, when there are limited financial resources or, during a pandemic that discouraged human contact, face to face interviews are not always the best option. The interviews were conducted virtually, as the data collection process was conducted during the time of COVID-19 when human contact was discouraged. However, this method also automatically excluded members of the population who do not have access to telecommunications (Gibbs, et al., 2002). Fortunately for this study, the participants were government officials, and it was assumed that they all had access to telecommunication devices.

The interviews were virtual, semi-structured, in-depth, and open- ended. The purpose of the interviews was to understand the institutional coping ability, and shed light on the factors that affects it in the context of climate coping mechanisms and practices at a municipal level in the country, with a particular focus on the Eastern Cape Province. The insight was gained through interviewing technocrats of climate change adaptation from relevant institutions. This form of data collection was suitable because:

1) Virtual interviews ensured that the data gathering process was done in a professional manner, since the people who were interviewed were professionals.
2) Semi-structured interviews ensured that no questions were left unanswered, as unclear answers could be clarified on the spot.
3) Through semi-structured interviews, the researcher gained a detailed description from the experts and the relevant individuals about the subject of climate change.

b. Workshop

The other method that was used to collect data was the workshop technique. Similar to other data collection methods, a workshop is intended to produce reliable and valid data that answers the research questions. A workshop is an arranged limited duration event, whereby a group of participants learn and discuss their views, experiences, and perspectives in regard to the subject of interest for data collection purposes (Ørngreen & Levinsen, 2017). It can be used to create a new concept or evaluate a specific aspect of interest (Thoring et al., 2020). The study applied a workshop technique to collect primary data from technocrats and decision makers from the different government institutions of the Limpopo Province, see Table 3.1. Even though the study focused on the Eastern Cape Province, it was purposefully decided to conduct a workshop in a different province to capture the broad views and experiences, and to avoid duplicating the data that was collected by means of interviews.

The institutions of interest were contacted, informed, and requested to participate in the workshop. The appropriate potential respondents were described to the institutions. Therefore, a purposive selection method was applied in the study. Upon approval, the institutions selected appropriate technocrats and councillors to participate in the workshop. Hence, a snowball effect method was also used to select the participants for the workshop. Thereafter, there was a discussion between the researcher and participants about the convenient date for the workshop. After an agreement, the date was set, and the workshop was conducted face-to-face in March 2023. The workshop for the study was designed to be self-contained, which means that the participants did not have to study before or after the workshop (Ørngreen & Levinsen, 2017). It was planned to create a controlled but open discussion between technocrats and decision-makers, and to produce data that shed light on climate change governance, particularly on the institutional coping ability of municipalities in South Africa.

The workshop was comprised of different sessions. To begin with, the respondents were subdivided into subgroups that consisted of a mix between technocrats and councillors. After that, the subgroups were requested to discuss and present different topics about climate change adaptation and disaster management at provincial and municipal level. The presentations were followed by questions and discussions about the views and opinions expressed in the presentation. One of the advantages of the data that is collected from the workshop is that it

can be presented, experimented with, and discussed immediately (Thoring et al., 2020). This ensures that the collected data is rigorously tested. In contrast, conducting a workshop is not an easy task, as it is challenging to document it from the beginning to end. In addition, a researcher needs to manage, manoeuvre, and be sensitive towards the different collaborative nature of different people, always ensuring that he/she is facilitating the process accordingly (Thoring et al., 2020).

c. Secondary data analysis

Secondary data analysis is one of the techniques that was used to collect data in this study. Researchers argue that this technique is one of the useful qualitative data collection methods (Richie, 2003; Kielmann et al., 2012). Scholars define secondary data analysis as an analyses of already available data that was collected by other sources, with the aim of improving the research or to answer a new academic question (Glass, 1976; Szabo and Strang, 1997; Kielmann et al., 2012; Johnston, 2014; Nayak and Singh, 2015; Tate and Happ, 2018; Ruggiano and Perry, 2019; Poth, 2019; Mweshi, 2020). Thus, other researchers define it as simply the re-use of qualitative data, especially by the researchers that were not involved in the original studies (VanScoy et al., 2018).

Access to data was considered before the consideration of this method for this study, and the technique was preferred due to the availability of government gazettes for public use. Relevant climate change policies, strategies, and reports from the institutions of interest were reviewed in this research, to understand climate change governance, particularly the evaluation of the institutional climate change adaptive capacity. The climate change documents that were reviewed are listed below.

i. National Climate Change Response White Paper (2011)
ii. National Climate Change Adaptation Strategy (2020)
iii. Climate Change Let's Respond Toolkit (2012)
iv. South African First Annual Climate Change Report (2015)
v. Eastern Cape Climate Change Response Strategy (2011)
vi. Buffalo City Municipality Climate Change Strategy (2014)
vii. Nelson Mandela Bay Municipality Climate Change and Green Economy Plan (2015)
viii. ADM Climate Change Vulnerability Assessment and Response Framework (2011)

ix. Chris Hani District Municipality Environmental Management Strategy (2018)
x. Mbizana Local Municipality Climate Change Response (2015)

It must be noted that the reviews focused on the climate resilience sections. The secondary information shed light on the existing policy frameworks and challenges of climate resilience, in addition, it provided an insight in the evaluation processes of the preparedness of municipalities in the country, with particular focus on the Eastern Cape Province.

3.3.4 Data analysis

The analytic process is a progression from the description to the interpretation of data. Therefore, data analysis is a process of interpreting the collected data with the aim to address the purpose of the study. The study applied two data analysis methods: thematic data analysis and policy content analysis. The thematic data analysis method was used to interpret primary data, and policy content analysis was useful for the interpretation of the secondary data. These techniques uncovered the relationships, trends, and themes within the gathered information. The analysis methods are discussed below.

a. Thematic analysis

It is a qualitative analysis process (Boyatzis, 1998; Alhojailan, 2012). Boyatzis (1998) argues that thematic analysis is identifying what is hidden in raw data. This analytical method is comprised of examining the data from interviews and a thorough search for repeated patterns of meaning (Braun and Clarke 2006). Thus, other researchers opined that this technique is for spotting, examining, and reporting repeated patterns that standout from the data (Braun and Clarke, 2006; Alhojailan, 2012).

The study followed the steps outlined by Boyatzis (1998), and Braun and Clarke (2006) for thematic analysis. To begin with, the researcher went through the audio data before transcribing it to text. In addition, the researcher re-read the text for a better understanding of the collected primary data. The exercise provided the researcher an opportunity to be familiar with the research. The next step was to group similar data into the subgroups mentioned below.

i. Appraisal of policy framework for promotion of institutional adaptive capacity to climate change in municipalities of the Eastern Cape Province.
ii. Challenges, lessons, and opportunities of climate resilience in the country.
iii. Evaluation of institutional adaptive capacity to varying climate in the province.

This was followed by identification of patterns and themes, using an inductive approach. Inductive thematic analysis is a process of data coding without trying to fit it into a pre-existing coding frame (Brown and Clarke, 2006). Therefore, the analysis was data-driven. The whole data was interrogated repetitively, in search of recurring patterns of meaning. The identified themes were then revised to confirm that they addressed the research question. The next step was to define and name the themes as follows:

i. Level of promotion of institutional adaptive capacity by climate resilience policy framework in the Eastern Cape Province.
ii. Institutional dynamics that impact the climate coping mechanisms in municipalities of the Eastern Cape Province.
iii. Appraisal of institutional adaptive capacity to climate change of municipalities in the province.
iv. The contribution to academic literature, and study findings impact in the greater context of the country.

In conclusion, the themes were used to generate the final thesis. It must be noted that thematic analysis has several advantages and disadvantages. It can generate detailed data, and it has flexibility as the themes are identified by the judgement of the researcher (Boyatzis, 1998; Brown and Clarke, 2006). The disadvantage of this analysis method is a likelihood of a weak unconvincing analysis, or not analysing data at all, and the possibility of using data collection questions as themes.

b. Policy content analysis

The second source of data is secondary data that is made up of data collected from climate resilience policies of all government levels. The main objective of conducting policy content analysis in this research was to unpack the influence that the national climate resilience legislative framework has on local coping strategies. The policy content analysis framework that was applied was based on the guidelines by Salamon (2000) and Phulkerd et al., (2017)

for policy analysis. To begin with, the researcher probed the presence of adaptation policy in relevant institutions gain insight into the policy framework for climate resilience in the country, with particular interest in the Eastern Cape Province. The task required the researcher to go through published documents of the institutions, and referral of documents by the respondents.

Upon identification of the documents, it was discovered that most documents had both mitigation and adaptation sections. For the study, the researcher concentrated on climate change adaptation sections. Thereafter, the development, implementation, and evaluation aspects of the documents were analysed to shed light on how policy framework promotes the institutional preparedness for varying climate in municipalities. Additionally, the South African First Climate Change Report was also analysed for better understanding of the climate change governance, particularly the institutional adaptive capacity of municipal institutions. The subsequent step was to group similar data into the subgroups mentioned in detail in section 3.4.4a. The data was then coded using the inductive approach. The identified themes were then reviewed to ensure that they address the research question. The subsequent stage was to come up with themes. It must be mentioned that most of the themes were the same as those detailed in section 3.4.4a above. In conclusion, the themes were used to generate the final thesis.

3.4 Methodological reflections

Researchers are part of the world they are researching (England, 1994). Cousin (2010) argues that researchers should be mindful of their prejudice or inside/outside status during the data collection process. Hence, the researchers should identify individual prejudice before gathering data to eliminate bias (Bourke, 2014). The researcher is originally from the study area; therefore, perception and first-hand experience of being part of the community may be on display in the data analysis section. As an insider, the researcher already had a perception about the local government authorities. In addition, Bourke (2014), argues that the issues of positionality will be on display throughout the data collection process. An element of disagreement or opposing the findings that are far from the Eastern Cape local municipalities reality may arise. From first-hand experience, citizens from the area are generally not satisfied with the performance of the local government institutions. The study was conducted to reflect the opinions of the participants by allowing the respondents to fully express their views.

The major challenges were the result of conducting the study during the COVID-19 pandemic. The conditions were extremely difficult to carry out the research in a normal way as the world was on standstill and nothing was normal. As a result, difficulties were experienced when there was a need for supervision sessions, and during data collection stage of the study as all face-to-face meetings were discouraged or prohibited due to the pandemic. The university adjusted, and virtual supervision sessions were introduced. Although this type of supervision was not ideal, it was effective. The challenges of data collection were much harder to solve. All the participants of the study were professionals from government and government advisory institutions. The pandemic made it extremely difficult to organise the interviews, as all the employees other than essential workers were working from home. It was challenging to get hold of the receptionist, and all other relevant people for approval of the application to participate in the study. Upon approval, it was challenging to organise the virtual interview. As a result, the period of data collection was longer than anticipated.

Another challenge was the funding of the study. The researcher had funding issues in the first year of the study, year 2020, which was the height of the pandemic. It was challenging to be motivated and focus on the research as there were financial uncertainties that may have resulted in discontinuation of the study. The researcher received funding from National Research Funding (NRF), and GeoTerraImage Education Funding late in 2020. Chances of failure or incompletion of the research were high without funding. The researcher realised that one of the important aspects for success at doctorate level is funding. To ensure success, it is important to ensure that all students that embarked on a research journey at this level are sufficiently funded.

Another challenge of conducting a research study during the pandemic was the frequent loss of loved ones. The deaths disrupted the research process as they were sudden and regular. It is quite challenging to concentrate on the study whilst regularly organising and attending funerals, and constantly grieving. Each death delayed the research process as the study had to be put on hold, up until the researcher had a clear mind-set to continue researching. This challenge further delayed the completion of the study.

The chapter presented the methodology that was applied in the study, describing the philosophical position, research design, research site, study population and sampling procedure, methods used to collect and analyse data, and concluded with methodological reflections. The next chapter comprise of presentation of empirical evidence. The results are structured and subdivided around the research questions.

CHAPTER FOUR[2]
EMPIRICAL EVIDENCE

4.1. Introduction

This section presents the empirical evidence, gathered between 2021 and 2023. In essence, this chapter examines and presents the results of the research. To achieve this, the data collected was scrutinised to draw out themes relating to the research questions. The results are structured and subdivided around the research questions of the study, presented in Section 1.3, in the following manner:

i. Appraisal of policy framework in advancement of capacity for climate resilience in municipal institutions of the Eastern Cape Province.
ii. Underlying forces of coping to varying climate at municipal level in the country.
iii. Appraisal of municipal coping ability to varying climate in the Eastern Cape Province.

Based on the subsections, this chapter begins by assessing the presence of the policy framework in the country in promoting the preparedness of local institutions for varying climate in the Eastern Cape Province. This section sheds light on the extent to which the policy framework promotes the climate resilience in municipalities. Participant's responses, government gazettes, reports, and climate change related documents were useful for this objective. The following section of this chapter is comprised of the presentation of data that highlights the barriers, challenges, lessons, and opportunities of climate resilience in municipalities. To achieve this, the Climate Change Let's Respond Toolkit was reviewed, which is a South African government tool to incorporate climate adaptation into municipal planning (DFFE, 2012). In addition, the climate policy documents from the institutions of interest were reviewed. Moreover, the respondent's views were critical in addressing this objective. The next section contains results about the assessment and monitoring of institutional adaptive capacity to varying climate in municipalities of the province. In conclusion of this chapter, there is a presentation of the meaning of the study results, in a wider context of South Africa.

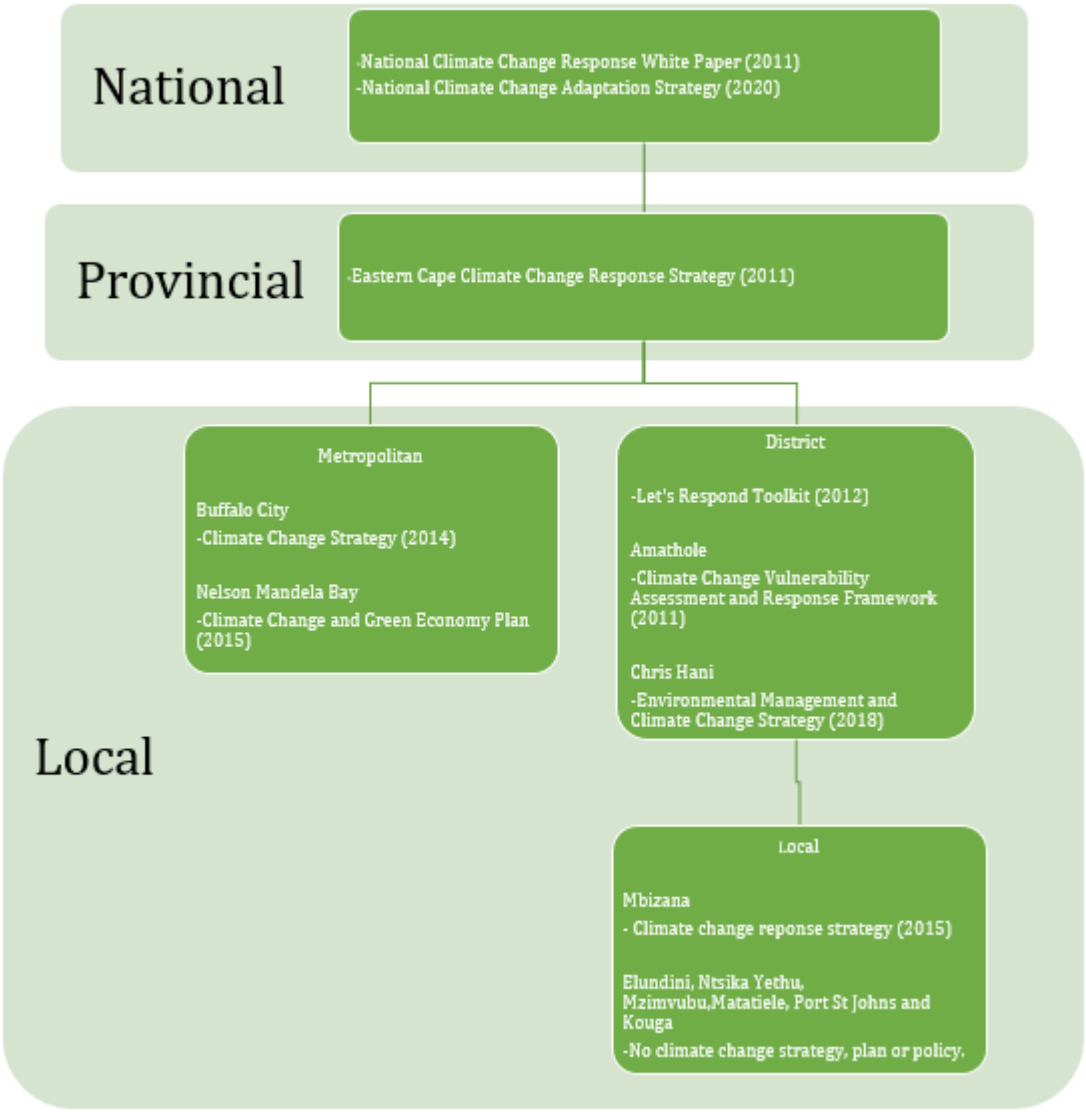
[2] This chapter is based on a paper that is under review for publication in Climate Resilience and Sustainability Journal (Title: The Complex Task of Evaluating the Institutional Adaptive Capacity to Climate Change at Local Government Level: A study of the Eastern Cape Province of South Africa).

4.2 Appraisal of policy framework in advancement of capacity to adapt to climate change at local government level.

This subsection presents the results on the assessment of policy frameworks in promoting the adaptive capacity at municipal level. One of the components of the study was the interest at the extent to which the government policy framework(s) promotes the institutional preparedness for varying climate at municipal level of the Eastern Cape Province. Existing policy framework for climate resilience in the country was explored. It was essential to get an insight of the landscape of policy framework for climate resilience at the study site, particularly how the policies are setup and actioned.

In view of the above, it was important to investigate the existing policy framework that guides climate resilience at the research site. First and foremost, it was critical to identify which local government institutions have a policy framework in place for climate resilience. The respondents from the municipalities were asked if their institutions have a climate change adaptation policy; the outcomes are presented in Table 4.1 below.

Figure 4. 1 Government policy framework for the municipal adaptation to climate change in the Eastern Cape Province

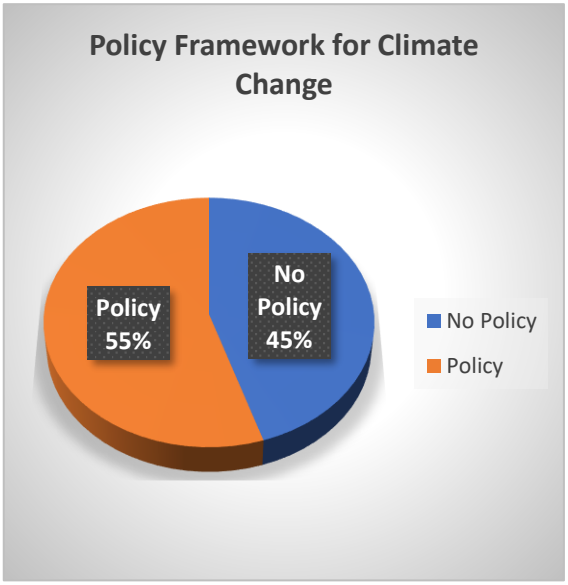


Source: Based on field notes (2021-2023)

In view of the above findings, the results contained in Table 4.1 and Graph 4.1 were used to develop Figure 4.1 below to illustrate the policy framework for climate resilience in the country, with specific focus on the Eastern Cape municipalities.

Table 4. 1 Municipal policy frameworks for adaptation to climate change in the Eastern Cape Province (N=11)

Names of Municipalities	Have Adaptation Policy	Have No Policy	Name of the Climate Change Adaptation Policy/Plan/Strategy
Nelson Mandela Bay Metropolitan	✓		Climate Change and Green Economy Plan (2015)
Buffalo City Metropolitan	✓		Climate Change Strategy (2014)
Amathole District	✓		Climate Change Vulnerability Assessment and Response Framework (2011)
Chris Hani District	✓		Environmental Management and Climate Change Strategy (2018)
Elundini Local		✓	
Mbizana Local	✓		Climate Change Response Strategy (2015)
Matatiele Local		✓	
Port St. Johns Local		✓	
Kouga Local		✓	
Ntsika Yethu Local		✓	
Mzimvubu Local		✓	
Total = 11	**5**	**6**	
Percentage= 100%	**45 %**	**55%**	



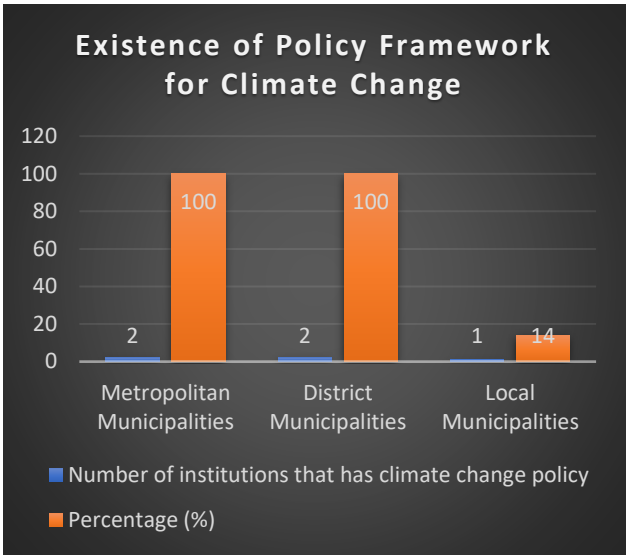
Graph 4.1

Source: Based on field notes (2021-2023)

The "✓" indicates whether a municipality has an adaptation policy or not.

Table 4.1 and Graph 4.1 indicate that some government institutions at the study site have policy framework in place for climate resilience**.** In addition, it was necessary to further examine and compare the levels of existence of policy framework amongst different types of local government municipalities. Table 4.2 below presents the level of policy framework for climate change of different types of local municipalities at the study site.

Table 4. 2 Existence of policy framework for climate change at local government (N=11)

Types of Municipalities	Number of Institutions	Have Policy	No Policy	Percentage	
Metropolitan	2	2	0	100%	
District	2	2	0	100%	
Local	7	1	6	14%	

Graph 4.2

Source: Based on field notes (2021-2023)

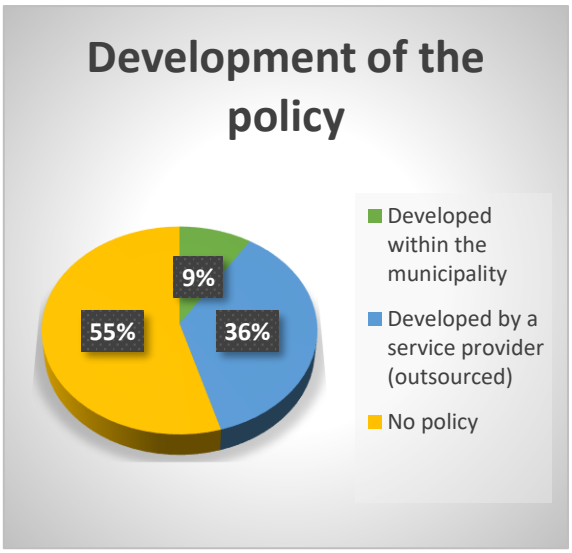
Table 4.2 and Graph 4.2 uncovered that the level of existence of policy framework amongst different types of local government institutions is not uniform. The results indicate that the existence of policy framework at local municipalities is low compared to district and metropolitan institutions. In support of the above results, the participant's comments are presented below:

Names of Institutions	Respondent's comments
SALGA	*"There has been progress in Metros and Districts municipalities, but not in so many local municipalities. There has not been a great deal of formalisation of the climate change response in the local government municipalities"* (personal communication, 2021a).
Amathole District	*"The local municipalities of this district do not have their own climate change responses, they are highly under capacitated"* (personal communication, 2021b).

One of the study interests was to examine how the policy frameworks promote the institutional adaptive to climate change. Hence, it was essential to examine the development and execution processes of coping strategies. This was achieved by questioning the respondents about the development process of the climate change adaptation policies, and the results are presented in table 4.3 below.

Table 4. 3 Development of the climate change adaptation policy in municipalities of the Eastern Cape Province (N=11)

Name of Municipalities	Policy developed by the municipality	Policy developed by a service provider (outsourced)	No Policy
Nelson Mandela Bay Metropolitan		✓	
Buffalo City Metropolitan	✓		
Amathole District		✓	
Chris Hani District		✓	
Elundini Local			✓
Mbizana Local		✓	
Matatiele Local			✓
Port St. Johns Local			✓
Kouga Local			✓
Ntsika Yethu Local			✓
Mzimvubu Local			✓
Total = 11	**1**	**4**	**6**
Percentage= 100%	**9%**	**36%**	**55%**



Graph 4.3.

Source: Based on field notes (2021-2023)

The "✓" indicates the developer of climate change adaptation policy.

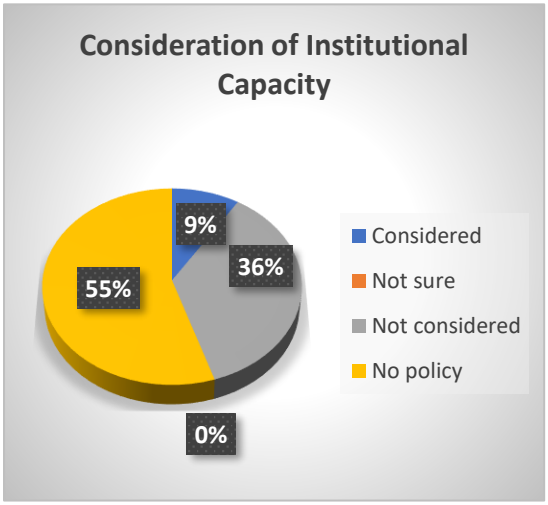
Table 4.3 and Graph 4.3 results uncovered that few local government institutions have policy for climate change adaptation, and even fewer have developed their own policy. In addition, the results indicate that climate change policies are rarely developed within the local government institutions. In support of these results, the participant's comments are presented below:

Names of Institutions	Respondent's comments
Amathole District	*"Policy development is very complex; hence most municipalities outsource this service. We just guide the public participation, stakeholder mobilisation and inclusivity of stakeholders"* (personal communication, 2021c).
Nelson Mandela Bay Metropolitan	*"Funding was obtained from the Electricity & Energy Directorate and a service provider was appointed. I was asked to assist in the coordination of the action plan and provided guidance to the consultants on how best to gain collaboration from individual service delivery departments within the municipality"* (personal communication, 2021d).

As mentioned before, one of the interests of the study was to understand the extent to which the policy framework promotes the institutional adaptive capacity. In view of this, it was vital to examine if the capacity of the institutions were considered during the development stage of the policy. In consideration of this view, the respondents were questioned about the consideration of institutional capacity during the development of the policy; the results are presented in Table 4.4 below.

Table 4. 4 Institutions that considered capacity during policy development (N=11)

Names of Municipalities	Considered	Not sure	Not considered	No policy
Nelson Mandela Bay Metropolitan			✓	
Buffalo City Metropolitan			✓	
Amathole District			✓	
Chris Hani District				
Elundini Local	✓			✓
Mbizana Local			✓	
Matatiele Local				✓
Port St. Johns Local				✓
Kouga Local				✓
Ntsika Yethu Local				✓
Mzimvubu Local				✓
Total = 11	**1**	**0**	**4**	**6**
Percentage = 100%	**9%**	**0%**	**36%**	**55%**



Graph 4.4.

Source: Field-based interview notes (2021-2023)
The "✓" indicates if the institutional capacity was considered or not.

Table 4.4 and Graph 4.4 results indicate that most local government institutions are yet to develop the resilience policies. In addition, the municipalities that have a policy framework in place hardly consider the institutional capacity during the development stage of the policy. In support the above results, respondent's comments are presented below.

Names of Institutions	Respondent's comments
Amathole District	*"We developed the climate change policy in a generic manner; therefore, we did not consider the adaptive capacity. Ideally, we were supposed to consider the adaptive capacity, but in reality, that is not a simple task, considering the limited capacity we have"* (personal communication, 2021e).
Nelson Mandela Bay Metropolitan	*"The capacity (future or existing) was not necessarily outlined within the action plan. The plan was meant to be a guide for Directorates or project managers to use, specifically because there are interventions per asset area which would reduce the risks from climate impacts and potentially support of the green economy"* (personal communication, 2021f).

To fully comprehend the promotion of an institutional adaptive, it was necessary to examine the implementation of the existing policies, strategies and plans. In view of this, the research participants were requested to comment on how the existing policy framework for climate resilience is implemented. The responses of the participants are presented below.

Names of Institutions	Respondent's comments
Mbizana Local	*"Although the municipality has its own climate change response policy, it is under capacitated, human and financial, to implement"* (personal communication, 2021g).
Amathole District	*"Implementation of developed policies are hindered by fiscal constraints, and therefore, we are working backwards"* (personal communication, 2021h).
Chris Hani District	*"We only have four people, dealing with 6 local municipalities with different climate change impacts, therefore, we lack human capacity, and the financial capacity is also lacking"* (personal communication, 2022a)

4.3 Underlying forces of adapting to climate change at municipal level.

Another study interest was to identify and examine the institutional challenges, barriers, and opportunities of climate resilience. This was achieved by interrogating the participants (interviews and workshop) on the institutional challenges, barriers, knock on effects and opportunities they encounter during the pursuit of climate resilience. To begin with, it was necessary to detect the climate resilience's primary challenges, and frequency in which they are mentioned by respondents from different institutions. The results are presented in Table 4.5 below.

Table 4. 5 Primary challenges for climate change adaptation at local government level in South Africa (N=46)

Primary challenges	Number of times the challenge was selected by the participants (46)	Percentage (%)	Identification of the challenge frequency rate	Types of capacity				
				Research	Policy	Financial	Human	Institutional setting
No legislation for climate change	37	80	High					✓
Lack of political will/support	39	85	High					✓
Insignificant contribution towards the overall performance	30	65	Medium					✓
Unfunded mandate	32	70	High			✓		✓
Lack of financial resources	44	95	High			✓		✓
Lack of human capacity	39	85	High				✓	✓
Lack of knowledge and information	32	70	High	✓			✓	✓
Absence of climate change champion	25	55	Medium				✓	✓
Positioning of climate change within the local government institutions.	12	25	Low					✓

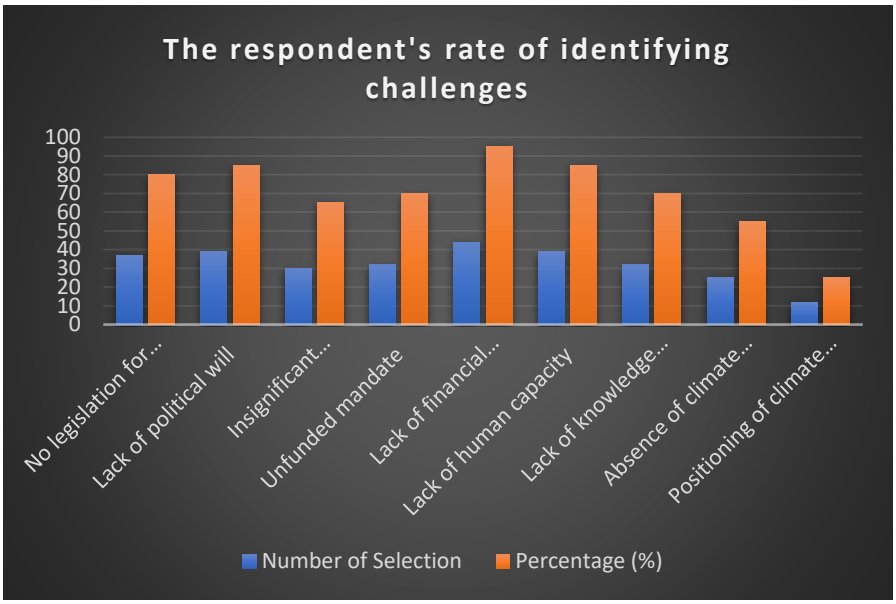
Source: Based on field notes (2021 - 2023)

The (✓) indicates capacity types that is linked to the challenge.

Scale:

Low	Less than 33.3%
Medium	33.3 -66.6%
High	More than 66.6%

Graph 4.5. Based on Table 4.5



Source: based on field notes (2021-2023)

Table 4.5 and Graph 4.5 results indicate that there are many primary challenges for climate resilience. In addition, the results illustrate that same challenges were mentioned in an irregular manner by respondents from different institutions. In addition, Table 4.5 results uncovered that challenges of climate change adaptations are linked to different types of capacity. In support of the above results, some of the participant's comments are presented below.

Names of institutions	Respondent's comments
Amathole District	*"For our district, yes, we do have qualified individuals, therefore, there are skills and competences, however, the vastness of the municipality overstretches the available human capacity. Moreover, we lack financial resources, and also in terms of political support, we are also lacking, as most politicians are not capacitated to understand climate change issues"* (personal communication, 2021i).
Nelson Mandela Metropolitan	*"Because of a lack of mandated staff, capacity, authority & budget, as mentioned, there is insufficient capacity to adequately comply with national legislation which prescribes or guides climate change responses"* (personal communication, 2021j).
Elundini Local	*"Politicians usually do not know what climate change is all about, other than what they hear on media. Most people do not relate to climate change, it is mythical to them. They only get serious when the disaster strikes. Therefore, we constantly need*

	to infuse in the mind of authorities that climate change is here, and the sooner we do something about it, the better" (personal communication, 2021k).

In addition, to fully grasp the issues of climate resilience in municipalities, it was important to identify the knock- on effects of the primary challenges and the current measures in place to combat the challenges. In view of this, this was achieved by interrogating the research informants; the results are presented in table 4.6 below.

Table 4. 6 Challenges, effects, and current measures in place at local government level

Challenges	Effects	Current measures in place
No legislation for climate change	- Insignificant contribution towards the overall performance. -Low prioritisation.	None.
Lack of political will/support	- Insignificant contribution towards the overall performance. -Low prioritisation.	Climate change training offered to councillors.
Insignificant contribution towards the overall performance	-Low prioritisation.	None.
Unfunded mandate	-Lack of financial resources. -Unattended tasks. -Goals not met in time.	Applying for external funding, which their approval is mostly dependent on current financial state of the institution.
Lack of financial resources	-Shortage of funds. -unattended tasks. -Goals not met in time.	Applying for external funding, which their approval is mostly dependent on current financial state of the institution.
Lack of human capacity	-Lack of skilled personnel. -Absence of climate change champion. -Unattended tasks. -Goals not met in time.	-Outsourcing, when deemed necessary. -Employees with other primary responsibilities take climate change as an added- on task.
Lack of knowledge and information	-Unawareness of the issue. -Unable to adequately adapt.	-Climate change training offered to councillors. -Awareness campaigns
Absence of climate change champion	-Employees with inadequate climate change skills are responsible for climate change tasks.	Employees with other primary responsibilities take climate change as an added- on task.
Positioning of climate change within the local government institutions.	-Viewed strictly as an environmental challenge within the municipality.	None

	-It does not get the attention it deserves. -Responsibility of the least funded department. -Goals not met in time.	

Source: Based on field notes (2021-2023)

The results contained in table 4.6 uncovered that, in some cases, the primary challenges are knock on effects of each other. The results further revealed that some primary challenges have the same knock-on-effects. In addition, the results illustrate that in some cases there are no measures in place to tackle the climate resilience challenges and their knock- on effects.

Apart from challenges, lessons learnt from adapting to climate change was another aspect of climate change governance that the study was interested in. In consideration of this, the respondents were asked about the lessons learnt from actioned coping mechanisms at municipal level; the results are presented in Table 4.7 below.

Table 4. 7 Lessons learnt from adapting to climate change at municipal level.

Lessons	Type of municipality
Without capacity to implement, climate resilience policies, strategies and plans are ineffective.	**Metropolitan, district and local municipalities**
Public buy-in is vital in climate change adaptation.	**Metropolitan, district and local municipalities**
Traditional leader's buy-in is very important in climate resilience.	**District and local municipalities**
There is minimal development of infrastructure in response or in anticipation of climate change impacts.	**District and local municipalities**
The importance of awareness programmes	**Metropolitan, district and local municipalities**

Source: Based on field notes (2021-2023)

Table 4.7 uncovered that there are several lessons that were learnt from climate resilience actions in municipalities, and most of them are the same across different types of municipal institutions. In support of the results, the respondent's comments are presented below.

Names of institutions	Respondent's comments
Amathole District	*"Traditional leaders are important because they are in charge of communal land and most of climate change related disasters or activities happen within that space. The biggest chunk of land in Amathole District Municipality is communal land"* (personal communication, 2021l).
Nelson Mandela Metropolitan	*"There is no infrastructure built that was but in response or in anticipation of climate change, because much of the service infrastructure predates current legislation"* (personal communication, 2021m).
Mbizana Local	*"One program that we did every year, and we are satisfied with is the awareness program. Due to frequent veld fires, there are awareness programs for villages to warn them in time. One of our mandates is to educate the community, we have 4 awareness workshops (for example, river pollution, recycling, etc.) per year and we ensure that one of them is about climate change"* according to the Mbizana local municipality participants (personal communication, 2021n).

Although climate change impacts human and environmental systems in a devastating manner, the study was interested in the opportunities presented by varying climate. In consideration of this, respondents were interrogated about the prospects presented by varying climate, and climate change documents were analysed. The results are presented in Table 4.8 below.

Table 4. 8 Opportunities presented by climate change responses in South Africa

Opportunities	South Africa's First Annual Climate Change Report	Climate Change Let's Respond Toolkit	Research participant's views
Job creation	✓	✓	✓
Skills development	✓		✓
Sustainable natural resources management	✓	✓	✓
Emissions reductions	✓	✓	
Food security	✓		
Information and knowledge management	✓		✓
Awareness raising	✓		✓
Economic development	✓	✓	

Improved health care	✓	✓	
Improved quality infrastructure design	✓		
Improved education	✓		
Improved livelihoods	✓		
Improved quality of life		✓	✓
Urban greening		✓	
Energy efficiency		✓	
External funding support			✓

Source: Based on field notes, (2021-2023)

The "✓" indicates if an opportunity was mentioned in the document or by respondents.

Table 4.8 results revealed that there are many opportunities that are presented by climate change responses in South Africa. Additionally, the results uncovered that some opportunities are mentioned by all data sources, whilst others are not.

4.4 Appraisal of municipal adaptive capacity to climate change

The study was also interested in the evaluation and monitoring process of the municipal coping ability to varying climate. Different aspects of institutional coping ability were probed to adequately address the research question. To begin with, it was important to identify the impacts of varying climate that demand response from different municipalities. To achieve this, the participants were requested to comment on how the varying climate manifests itself in different municipalities of the province. Additionally, the Let's Respond Toolkit, and other climate change related documents from the institutions of interest were analysed. The results are presented in Table 4.8 below

Table 4. 9 Impacts of climate change at local government institutions in Eastern Cape

Impacts of Climate Change	Names of Municipalities										
	Nelson Mandela Bay MM	Buffalo City MM	Amathole DM	Chris Hani DM	Mbizana LM	Elundini LM	Matatiele LM	Port St. Johns LM	Kouga LM	Mzimvubu LM	Ntsika Yethu LM
Change in temperature patterns	X	X	X	X	X	X	X	X	X	X	X
Change in rainfall patterns	X	X	X	X		X	X	X	X	X	X
Drought	X	X	X	X					X		X
Water scarcity		X	X	X							X
Storms surge	X	X	X								
Sea level rise	X		X								
Floods	X	X		X		X	X			X	X
Soil erosion		X	X								
Sedimentation		X	X								
Decreased water quality in ecosystems			X	X							
Wildfires	X		X		X	X	X		X	X	
Heatwaves		X	X								
Gale Winds	X					X	X	X	X		
Shift in distribution of marine species		X			X						
Extreme temperatures		X	X	X	X			X		X	X
Loss of agricultural land				X							
Loss or change of high priority biomes			X	X							
Loss or change aquatic ecosystems		X	X								
Increase migration from rural to urban and peri-urban areas			X	X							

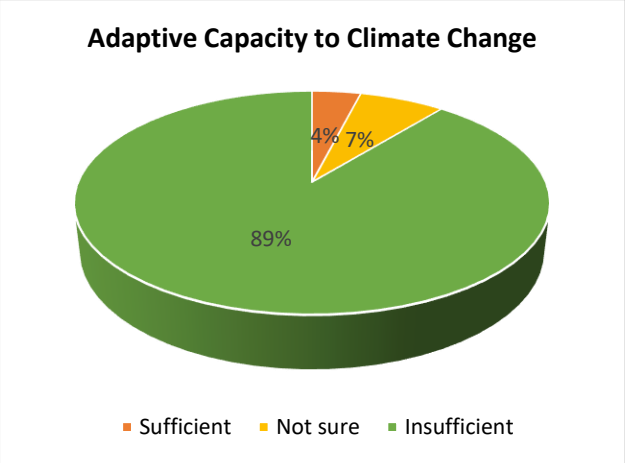
Source: Based on field notes (2021 & 2022)

*The (x) indicates that the impact has been identified in the municipality.

Table 4.9 outcomes indicate that effects of varying climate are differently felt in different municipalities within the province. Moreover, the outcomes uncovered that the number and types of impacts are not uniform across the municipalities.

Upon the identification of the impacts, it was important to establish if there was sufficient capacity to respond to impacts at municipal level. In consideration of this, this was achieved by interrogating the participants about the level of preparedness in municipalities; the results are presented in Table 4.10 and Graph 4.6 below.

Table 4. 10 Respondent's views on institutional adaptive capacity to climate change (N=46)

Choices	Number of respondents	Percentage	
Municipalities have sufficient adaptive capacity	2	4%	
Not sure	3	7%	
Municipalities have insufficient adaptive capacity	41	89%	
Total	46	100%	

Graph 4.6.

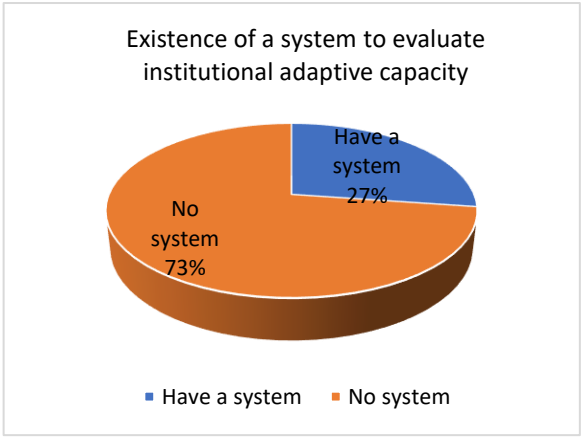
Source: Based on field notes (2021-2023)

Results contained in Table 4.10 and Graph 4.6 demonstrate that an overwhelming majority of the participants indicate that South African municipalities have insufficient adaptive capacity for climate resilience.

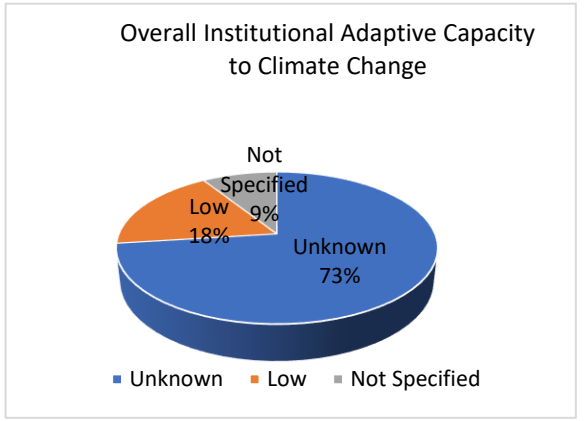
Moreover, it was also essential to identify the existing systems that are used to evaluate the institutional adaptive capacity of municipalities in the province. Additionally, it was important to examine the overall coping ability of the municipalities, according to the existing systems. The results are presented in Table 4.11 below.

Table 4. 11 Systems for evaluation and monitoring of institutional adaptive capacity (N=11)

Name of Municipalities	No System	System	Name of the Systems			Overall Adaptive Capacity
			Let's Respond Toolkit (LRT)	Integrated Development Plan (IDP)	Climate Change Vulnerability Assessment and Response Framework (CCVARF)	
Nelson Mandela Bay	✓					Unknown
Buffalo City	✓					Unknown
Amathole		✓	✓	✓	✓	-Low (LRT) -Not specified (IDP) -Not specified (CCVARF)
Chris Hani		✓	✓			-Low (LRT)
Elundini	✓					Unknown
Mbizana		✓		✓		-Not specified (IDP)
Matatiele	✓					Unknown
Port St. Johns	✓					Unknown
Kouga	✓					Unknown
Ntsika Yethu	✓					Unknown
Mzimvubu	✓					Unknown
Total = 11	**8**	**3**				
Percentage = 100%	**73%**	**27%**				



Graph 4.7



Graph 4.8

Source: Based on field notes (2021 & 2022)

The (✓) indicates that the system is used by the municipality.

The results in Table 4.11 and Graph 4.7 uncovered that there are few municipalities at the study site that have systems in place for evaluation of institutional adaptive capacity. In addition, Table 4.11 and Graph 4.8 uncovered that most government institutions at local level do not evaluate their adaptive capacity and, subsequently, their overall capacity to respond to varying climate is unknown.

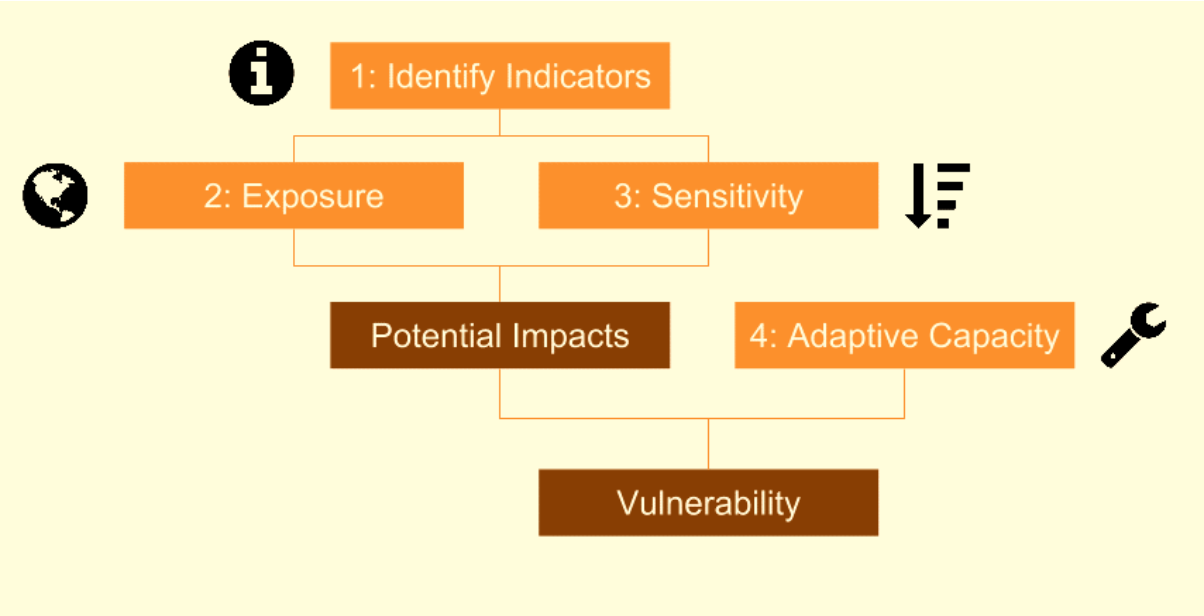
After identifying the systems, it was important to further examine how the systems evaluate the institutional adaptive capacity. In consideration of this, the relevant government documents were reviewed, and the respondents were interrogated about the systems how the systems assess the institutional adaptive capacity. The results are presented below.

(i) Climate Change Let's Respond Toolkit

According to the Climate Change Let's Respond Toolkit, there are 4 steps in a vulnerability assessment of government institutions.

i. Identify potential impacts of indicators.
ii. Assess whether the impacts will take place (exposure)
iii. Assess how important the risk is (sensitivity)
iv. Assess if you can respond to the risk (adaptive capacity)

Figure 4. 2 Let's Respond Toolkit steps of the vulnerability risk assessment



Source: DFFE (2012)

Figure 4.1 illustrates that the adaptive capacity is the last step of the vulnerability risk assessment. In addition, the figure indicates that the potential impacts and vulnerability play vital roles in determining the institutional adaptive capacity.

Furthermore, the toolkit points out that the adaptive capacity is usually scored using high, medium, or low rating, and the total score is the sum average of high, medium, and low scores of the different systems (research, policy, institutional support, finance, and community).

(i) Climate Change Vulnerability Assessment and Response Framework (CCVARF)

CCVARF is one of the available tools to assess the institutional coping ability of municipalities. Table 4.12 below illustrates how CCVARF assesses institutional adaptive capacity at Amathole District municipality.

Table 4. 12 Risk and Vulnerability Assessment of Amathole District Municipality IDP and Sector Plans

Impacts		Risks to ADM			Adaptive Capacity					Relevance to ADM IDP and adopted ADM Sector Plans																														
Risk Category	Impact	Likelihood	Consequence (Exposure & Sensitivity to Climate Change)	Significance (Likelihood x consequence)	Technical Capacity	Financial Capacity	Awareness and planning	Institutional Capacity	Vulnerability of ADM	IDP	Risk Management	Business Continuity Disaster Recovery	GIS	IT	Communications	HDI Toolkit	Donor Management	Revenue Enhancement	Land Reform and Settlement	Housing Strategy	SDF	Economic Development	Integrated Agricultural Plan	Tourism	Heritage Resources	IEMP	Disaster Management Risk and Vulnerability	District Fire Prevention	Disaster Management Plans	Communicable Diseases Prevention and Control	Disaster Risk Management Plan	Fire Risk management Plan	Integrated Transport	Waste Management	Water Services
Water	Increased variability and intensity of stormflow and dry spells/droughts	Likely	Major	3					3	1		1	1		1						1		1			1	1		1		1					1
Water	Reduced median annual stream-flow (west)	Possible	Major	3					3	1		1	1		1						1		1			1										1
Water	Increased cost of water services e.g. 10% decline in run-off could double the cost of new water schemes	Likely	Major	3					3	1		1	1		1				1	1	1	1	1	1		1				1						1
Water	Reduced predictability of weather, more intense floods and increased return period for flooding	Likely	Major	3					3	1		1	1		1				1	1	1		1			1	1		1		1					1
Agriculture and food security	Reduced availability of irrigation water	Possible	Moderate	2					2	1					1				1		1	1	1													1
Agriculture and food security	Increased risk of reduced yield and failure of rainfed/subsistence crops	Likely	Major	3					3	1					1				1		1	1	1													
Agriculture and food security	Increased pest and disease infestations	Likely	Major	3					3	1					1				1		1	1	1							1						
Agriculture and food security	Increased soil erosion associated with extreme weather events	Possible	Moderate	2					2	1					1				1		1		1													
Agriculture and food security	Thermal stress - livestock and crops	Likely	Moderate	3					3	1					1				1		1		1													
Agriculture and food security	Increased bush encroachment and alien invasives	Possible	Moderate	2					2	1					1						1		1					1				1				

Source: Amathole District Municipality (2011)

According to the CCVARF of the Amathole District Municipality (ADM), the score of the institutional adaptive capacity is the sum average of the technical, financial, awareness and planning, and institutional capacity of the municipality. In addition, this document indicates that an evaluation of the coping ability requires inputs from within the institution. The institutional adaptive capacity of ADM was yet to be assessed at the publication of CCVARF.

(ii) Integrated Development Plan (IDP)

The IDP was mentioned by respondents as another tool that is used to evaluate the institutional adaptive capacity of municipal institutions. Table 4.13 below is an environmental management section, extracted from the IDP of the Amathole District Municipality.

Table 4. 13 Climate change in the Integrated Development Plan

Evidential Criteria/ KPIs	Applicable to	Y / N	Comments and Improvement Measure	Who will assist the Municipality	By when?	Comments expected from
1.5 ENVIRONMENT MANAGEMENT:						
1.5.1 AIR QUALITY MANAGEMENT a) Does the IDP reflect the presence of an air quality management plan (AQMP) as contemplated in Section 15(2) of the NEMA: Air Quality Act 39 of 2004	ALL	Y	The institution has catered for the KPI in its ADM IDP and SDBIP and reported on a quarterly basis	N/A	N/A	N/A
b) Is the municipality a licensing authority?	Metro	N	N/A	N/A	N/A	N/A
1.5.2 CLIMATE CHANGE a) Does the municipality have a climate change response strategy or activities that respond to climate change?	ALL	Y	There is an ADM Climate Change strategy.	N/A	N/A	N/A
1.5.3 NATURAL ENVIRONMENTAL ANALYSIS: Is there a summarized analysis of the natural environment including assets and threats?	LM's	Y	There is in the EMP and the IDP of the municipality.	N/A	N/A	N/A
a) Is there an indication of how the municipality intends to use and protect its natural resources/protected areas and heritage as its comparative and competitive advantage?	LM's	Y	Yes both the EMP and the heritage Strategy and is part of the SDBIP and reported on a quarterly basis.	N/A	N/A	N/A
b) Are there mechanisms to capacitate local communities on environmental issues	LM's	Y	There are on a quarterly basis and the targets are part of the SDBIP and reported on a quarterly basis	N/A	N/A	N/A
c) Is there a functional environmental unit/ environmental official in place to implement environmental plans and programmes?	LM's	Y	There is a unit and personnel, there are targets in the SDBIP and reported on a quarterly basis	N/A	N/A	N/A
d) Are there any projects that address environmental challenges	LM's	Y	The institution has catered for the KPI in its ADM IDP and SDBIP and reported on a quarterly basis	N/A	N/A	N/A
e) Is there a plan to address land degradation and revitalization?	LM's	Y	The KPI is part of the Environmental Management Plan(EMP)	N/A	N/A	N/A
f) Are there any environmental by-laws in place? How are they enforced?	LM's	Y	The function is done together with the Community services department and is also reflecting in the ADM IDP and SDBIP, reported Quarterly	N/A	N/A	N/A
g) Is there an indication of the capital projects that will require environmental authorization to comply with an EIA process?	LM's	Y	The function is done together with DEDEAT.	N/A	N/A	N/A
h) Is there evidence indicating an attempt to develop environment planning tools such as SOER, EMFs, Coastal Management Plans, aquatic ecosystem, ecological infrastructure, wetlands bioregional plans and associated EMPs?	LM's	Y	ADM EMP and IDP does cover that.	N/A	N/A	N/A
i) Does the IDP reflect National and Provincial Initiatives (human resources and projects)?	LM's	Y	The ADM IDP and SDBIP does reflect on the alignment of 3 sphere of governance.	N/A	N/A	N/A

Source: Dept. of Cogta, (2022)

Table 4.13 indicates that climate change is part of the IDP; however, there is no evidence that illustrates the evaluation of the institutional coping ability to varying climate, although some respondents claimed to use the IDP to evaluate the adaptive capacity at municipal level.

(iii) No evaluation of adaptive capacity to climate change

Table 4.11, Graph 4.7, and Graph 4.7 revealed that 73 per cent of municipalities at the study site do not evaluate their climate coping capacity. In support of these results, the comments of the respondents are presented below.

Name of institutions	Respondent's comments
Lundini Local	*"We do not evaluate our adaptive capacity to climate change, other than that we follow the normal principles, for example, sustainable principles"* (personal communication, 2021o).
Amathole District	*"This district does not keep track of adaptive capacity to climate change of its local municipalities due to lack of capacity to perform such a task"* (personal communication, 2021p).
Nelson Mandela Metropolitan	*"The NMBM currently does not measure or evaluate its own climate change actions except where it is required by internal audit. These internal audit queries utilize key indicators which cannot be measured due to a lack of capacity, and are biodiversity-related, for example, the percentage of biodiversity conserved in order to cope with climate change)"* (personal communication, 2021q).
SALGA	*"For adaptive evaluation process to improve, it needs to be established first"* (personal communication, 2021r).
DFFE	*"We have developed a way on how these spheres of government can be assessed in a dashboard, but the challenges that we have experienced was that, conceptually a lot has been done, but the practical side is lacking due to lack of capacity to assess. Therefore, for the dashboard to work we need an input (underlying information) from the local government, and there is none. The dashboard will only be functional when the lack of capacity is addressed"* (personal communication, 2021s).

Upon identification and scrutiny of the systems used to evaluate institutional adaptive capacity, the next step was to investigate one of the main components of assessing institutional adaptive capacity, the selection of the determinants. This was done to probe the consistence in the selection of the determinants of institutional adaptive capacity. This was achieved by analysing

the existing evaluation systems and reports. In addition, the participants were requested to comment on the selection of the determinants. The results are presented in Table 4.14 below.

Table 4. 14 Determinants of institutional adaptive capacity to climate change

South African 1st Annual Climate Change Report	Climate Change Let's Respond Toolkit	Climate Change Vulnerability Assessment and Response Framework (CCVARF)	Participant's response
Policy, planning, and mainstreaming	Policy	Awareness and planning	Policy
Institutional capacity	Institutional support	Institutional capacity	Human
Research	Research	Technical capacity	Research
Coordination structure	Finance	Financial capacity	Finance
Tools/ guidelines	Community		Political support
Prioritisation of climate change adaptation measures/ actions			

Source: Based on field notes (2021-2023)

The results in Table 4.14 uncovered that respondents, systems and the report has selected identical, similar, and different determinants to evaluate the coping ability of the institution. In addition, the results indicate that the number of determinants range from four to six in all different data sources.

Upon establishing determinants, it was imperative to investigate how often a determinant is selected in or by different data sources. The results are presented in 4.15 and Figure 4.2 below.

Table 4. 15 Determinant's selection frequency by relevant sources

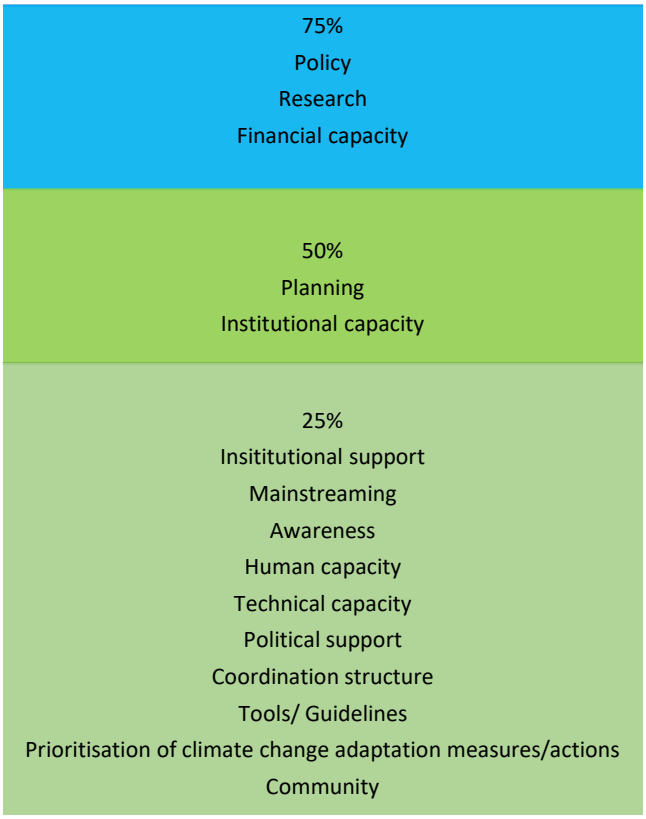
Determinants of institutional adaptive capacity	Total number of sources	Number of times the determinant is selected	Selection percentage
Policy	4	3	75%
Planning	4	2	50%
Mainstreaming	4	1	25%
Awareness	4	1	25%
Institutional capacity	4	2	50%
Institutional support	4	1	25%
Human capacity	4	1	25%
Financial capacity	4	3	75%
Political support	4	1	25%
Technical capacity	4	1	25%

Research	4	3	75%
Coordination structure	4	1	25%
Tools/ guidelines	4	1	25%
Prioritisation of climate change adaptation measures/ actions	4	1	25%
Community	4	1	25%

Source: Field-based notes (2021 & 2022)

The hierarchy of determinant's selection is presented in figure 4.2 below.

Figure 4. 3 The hierarchy of determinant's selection

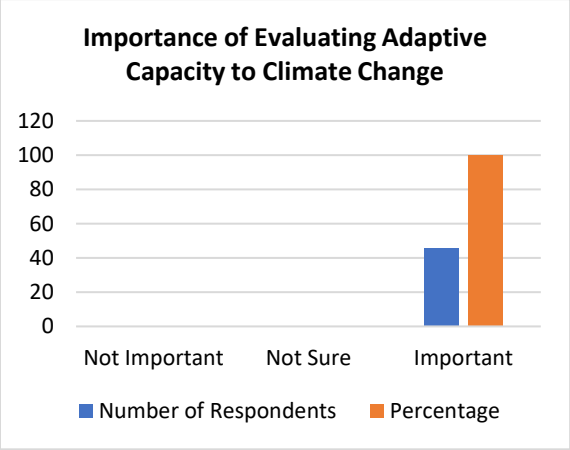


Source: Based on field notes (2021 & 2022)

The results in Table 4.15 and Figure 4.2 indicate that there is a high variation in the selection of determinants for evaluation of institutional adaptive capacity among different government sources.

Upon thorough scrutiny of the evaluation process of institutional coping ability, it was vital to establish the importance of developing a common system that can evaluate and monitor the institutional adaptive capacity of local government municipalities. The respondents were questioned about the subject, and the results are presented in Table 4.16 and Graph 4.9 below.

Table 4. 16 Importance of evaluating the institutional adaptive capacity to climate change (N=46)

Choices	Number of respondents	Percentage	
Important	46	100%	 **Graph 4.9**.
Not sure	0	0%	
Not important	0	0%	
Total	46	100%	

Source: based on field notes (2021-2023)

The results indicate that evaluation of institutional adaptive capacity is considered as essential at local government level. In support of the above results, the respondent's comments are presented below.

Names of institutions	Respondent's comments
SALGA	*"There is no structured process or framework that exist that can be used to evaluate or compare adaptive capacities of different municipalities according to certain indices in SA. There is a degree of adaptive capacity evaluation (e.g., of climate risks) during vulnerability and resilient assessment. It is essential to develop one, however, a system is as good as its input and output"* (personal communication, 2021t).
DFFE	*"There is a need for a system that measure or evaluate institutional adaptive capacity to climate change, but it should not be standard"* (personal communication, 2021u).

4.5 Conclusion

In summary, this chapter presents detailed results of data collected from the respondents and South African government gazettes such as the Climate Change Let's Respond Toolkit, 1st Climate Change Annual Report, climate resilience policies, and Integrated Development Plans of the relevant institutions. The study aimed to examine the complexities of evaluating the institutional adaptive capacity of municipalities. The empirical evidence shed insight on the landscape of policy framework for climate resilience, adaptation challenges, lessons and opportunities, and the assessment of institutional adaptive capacity in municipalities. The results indicate that:

a. The climate change coping strategies are limited to metropolitan and district municipalities and are almost non-existent at the local municipalities.
b. Nearly all the municipalities that have climate change adaptation policies in place, outsourced the task of developing the policies.
c. None of the municipalities considered their institutional capacity during the development of the coping strategies.
d. In most cases, implementation of the coping policies is hindered by the insufficient institutional capacity.

In addition, the results revealed underlying forces of climate resilience in municipal institutions. The results show that:

a. There are many primary challenges of climate resilience in municipal institutions. Additionally, the challenges have many knock- on effects, and there are few measures in place to address the challenges.
b. There are several climate change adaptation lessons that were learnt by local government level in South Africa.
c. There are numerous opportunities that are presented by varying climate in the country.

Furthermore, the results shed light on the evaluation of the institutional adaptive capacity at municipal level. The results uncovered that:

a. The climate change impacts do not only vary from one municipality to the next, but there is also a major variation within the municipalities, especially in district municipalities and municipalities that are near the ocean.

b. Nearly all the respondents are of the view that the municipalities lack institutional adaptive capacity for adequate climate resilience.
c. Climate Change Let's Respond Toolkit, Integrated Development Plan, and Climate Change Vulnerability Assessment and Response Framework were identified as the existing tools used to evaluate the institutional adaptive capacity to climate change at local government level in the Eastern Cape Province.
d. The overall institutional coping ability of most of the municipalities is unknown.
e. There is no consensus or standard determinants of the institutional adaptive capacity for municipalities.
f. There is acknowledgement that there is a need for a common system that can evaluate the institutional coping ability of the municipalities in the country.

This chapter presented the empirical evidence of the study, which was structured to indicate the research questions it is relevant to. The next chapter comprises of the analysis of the empirical evidence of the study. The analysis is structured to answer the research objective of the study.

CHAPTER FIVE
ANALYSIS AND DISCUSSION

5.1 Introduction

This study is dedicated to examining and understanding the process of evaluating and monitoring the institutional coping ability to varying climate at the municipal level in the Eastern Cape. This chapter discusses the empirical evidence presented in chapter 4. The chapter discuss and interpret the importance of the findings in relation to and in context of the study, and explain any new understandings of the area of research. Therefore, the discussions in this chapter are set up to respond to the aim and objectives of the research. This section was planned and sequenced to create a comprehensive understanding of the complexities of evaluating the institutional adaptive capacity of municipalities in the Eastern Cape Province and South Africa under four main objectives, which include:

(i) Views on how the policy framework influences the advancement of the institutional capacity for climate coping mechanisms at municipal level.
(ii) Adverse institutional factors that affect coping strategies, lessons learned, and prospects presented by varying climate change in South Africa.
(iii) Appraisal of municipal adaptive capacity for climate resilience in the province, and
(iv) Contribution to academic literature and study findings influence in the greater context of the country.

5.2 Insights on the impact of policy framework on institutional adaptive capacity to climate change in the Eastern Cape

The study intended to establish the perspectives on the role of policy framework in promoting the climate coping ability of municpalities in the country, particularly of the Eastern Cape Province. This study recognises the prominence of the climate resilience policy, particularly at the municipal level. The policy framework is a driver of climate resilience at municipal level. The RRIA framework contained in section 2.6 and the results in section 4.2 were used in this section to analyse the landscape of the policy framework for climate resilience, and its role in promoting the coping ability of municipalities.

Using the RRIA theoretical framework, the findings uncovered that the NCCR White Paper guides climate change governance in South Africa. Similar findings were made by Ziervogel

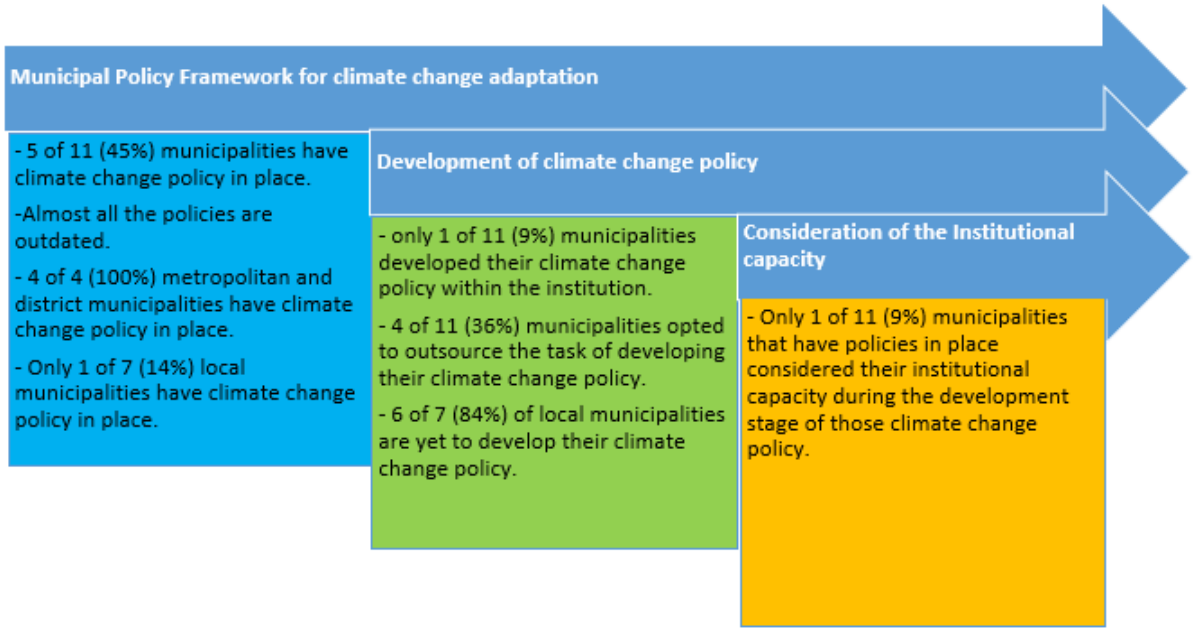
et al., (2014), and Montmasson-Clair and Zwane (2016) that the national government developed a policy framework that serves as a guideline, and it outlines what is expected from all government institutions, including at provincial and local level in terms of climate resilience. Hence, in fulfilment of the requirement of the National Climate Change Response Strategy, the Eastern Cape Government developed the ECCRS as a policy response to facilitate planning and coordination for mitigation and climate resilience within the province (DEDEA, 2011). The findings further revealed that the local government institutions are required by the National Climate Change Strategy to develop their own policy frameworks and mainstream climate change.

The study results in Figure 4.1 revealed that the policy framework for climate resilience is in present at all government levels. Figure 4.1 further demonstrate that all the metropolitan and district institutions in the province have coping strategies; however, few local municipalities have policies, plans and/ or strategies in place. In consideration of this view, there is evidence of progress in terms of coping strategies in metropolitan and district municipalities; however, there is a minimal climate resilience policy in the local municipalities. A similar finding was made by Fila et al., (2023) that an adaptation policy at smaller municipalities lags due to fiscal and political influence. The coping strategies are key for the actions of climate resilience, strategies are a guideline for coping mechanisms. Therefore, all municipalities need to have a climate resilience policy in place.

The findings further uncovered that almost all the existing climate resilience policies for government institutions in the province, including the provincial response strategy, are outdated. It has been established that this is caused by low prioritisation and lack of institutional capacity for climate resilience within the institutions. In assertion of this view, similar findings were made that most of the local municipalities in the province (Santhia et al., 2018), and in other parts of the country, such as the Western Cape Province (Pasquini et al., 2013), do not mention or consider climate change at all in their integrated development plans. The political powers are responsible for approval of institutional plans and budget allocations in municipalities of the country. Therefore, the success of development and implementation of an adaptation policy is reliant on capacity and, political will and support within the institution. Similarly, findings were made by Pasquini and Shearing (2014), and Leck and Simon (2018) that the lack of political will is challenge for climate resilience in South Africa. In view of this, it can be argued that the political will and support is required for fair prioritisation of climate resilience, and to subsequently promote the municipal coping ability.

As previously mentioned, the policy framework is a driver of climate change adaption in municipalities. Thus, the need to analyse the development and implementation processes of adaptation policies in the Eastern Cape Province. Table 4.2 to 4.4, and Graph 4.2 to 4.4 were used to analysis the development of the municipal policy framework for climate resilience in the province. The findings are illustrated in Figure 5.1 below.

Figure 5. 1 Development of the local government policy framework for climate change adaptation in the Eastern Cape Province.



Source: Field-based notes (2021-2023)

The findings in Figure 5.2 revealed that the task of developing the policies, plans and/ or strategies was outsourced by almost all municipalities that have climate change polices in place. The outsourcing of such a vital component of climate resilience highlights the lack of institutional capacity or low prioritisation of climate change. Similar findings were made by Adom et al. (2023) that the task of developing the existing policies, plans and/ or strategies was outsourced by most municipalities in this province, with little or no inputs from the key climate resilience stakeholders such as the government, communities and private organisations. Hence, the framework is the consultant's product rather than local or indigenous expertise and are often difficult to implement at the local level without consideration of the local context. In assertion of this view, Ziervogel et al., (2014) point out the minimal evidence for adaptation actions in municipal institutions in South Africa. It can be argued that the outsourcing of such

an essential task is accompanied by the danger of the policy not being as effective as planned within the institution, because it was not internalised during the development stage. In addition, the minimal involvement or exclusion of government in the policy development, which is a critical stage of adaptation, is concerning. The policy should be developed internally to ensure that the policy is understood and accepted by the entire organisation.

In addition, the findings uncovered that the development of the adaptation policy is generic, and that has resulted in disregard for institutional capacity in the development stage of the policy. The non-consideration of the institutional capacity highlights the unpreparedness for implementation. In assertion of this view, Pasquini and others (2015) discovered that most municipalities in the country have insufficient capacity to successfully action the coping strategies. In view of this, it can be argued that policy development without consideration of the institution's ability to implement is a challenge for climate resilience in municipalities. With this in mind, the capacity of the institution should be thoroughly considered during the development of the policy, as the success of the implementation process depends on it. In assertion of this view, Tschakert and Dietrich (2010) argue that the institutional adaptive capacity signifies the potential to implement adaptation measures that will assist in preventing or reducing the degree of possible impacts. Thus, Thi Hong Phuong and others (2017) opined that the effective implementation of coping strategies is dependent on the adaptive capacity of the institution. In view of this, it is necessary to consider the capacity of the institution when developing the climate resilience policy.

5.3 Institutional dynamics that impact the climate change adaptation at the local government level.

One of the objectives of this study was to create an inventory of institutional dynamics that impact the climate coping strategies of the municipalities. This is achieved by analysing the results in section 4.3 and 2.6 and applying the RRIA theoretical framework. The study findings in Table 4.5 and Graph 4.5 indicate that there are many institutional and capacity challenges for climate resilience in municipalities of the province, namely, the lack of legislation, political support, financial resources, human capacity, knowledge, absence of the climate change champion, insignificant contribution towards the overall performance, unfunded mandate, and positioning of climate change within the municipality. The findings underscore the views of Santhia et al., (2018) that insufficient financial resources, human capacity, knowledge and

information, remained significant barriers to any meaningful climate change administration in the province.

Additionally, the findings further illustrate that insufficient financial and human capacity, and political will are the most cited challenges of climate resilience at municipal level in the Eastern Cape Province. The finding is validated by the sentiments of Rosendo et al., (2018) that poor understanding of problem by politicians and insufficient funding are the most cited constraints of climate resilience in the country. Similarly, findings of Figure 5.1 depict that the leadership of most municipalities in the province low prioritise the development of the climate resilience policy. The low prioritisation of adaptation is partly due to absence of legislation for climate change. Similarly observations were indicated by Adom et al. (2023) that climate change is currently low priority in planning and budget allocation of most municipalities in the province. In view of this, the climate change governance is situated in a politically lead field; therefore, success in climate change adaptation requires political will and support, and allocation of resources, and currently, they are both lacking.

The findings further revealed that the challenges of climate resilience at the municipal level are linked to one another. The relationship between the identified primary challenges for adaptation in municipalities of the province is demonstrated in the figure 5.2 below.

Figure 5. 2 Relationship between the primary challenges of adaptation to climate change at local government level in the Eastern Cape Province.



Source: Based on field notes (2021-2023)

The findings in Figure 5.2 illustrate that the insufficiency of knowledge and information to enlighten the decision-makers (politicians) is at the core of climate resilience challenges. This results in insufficient political will and absence of legislation for climate resilience. Subsequently, the climate actions are positioned in the peripherals of the institution, with minimal resources. Similar findings were made by Rosendo et al., (2018) that the poor climate change awareness by politicians is the source of adaptation issues in municipal institutions of South Africa. Therefore, climate change education and training for decision-makers should be prioritised in municipalities of the province, and in other parts of the country.

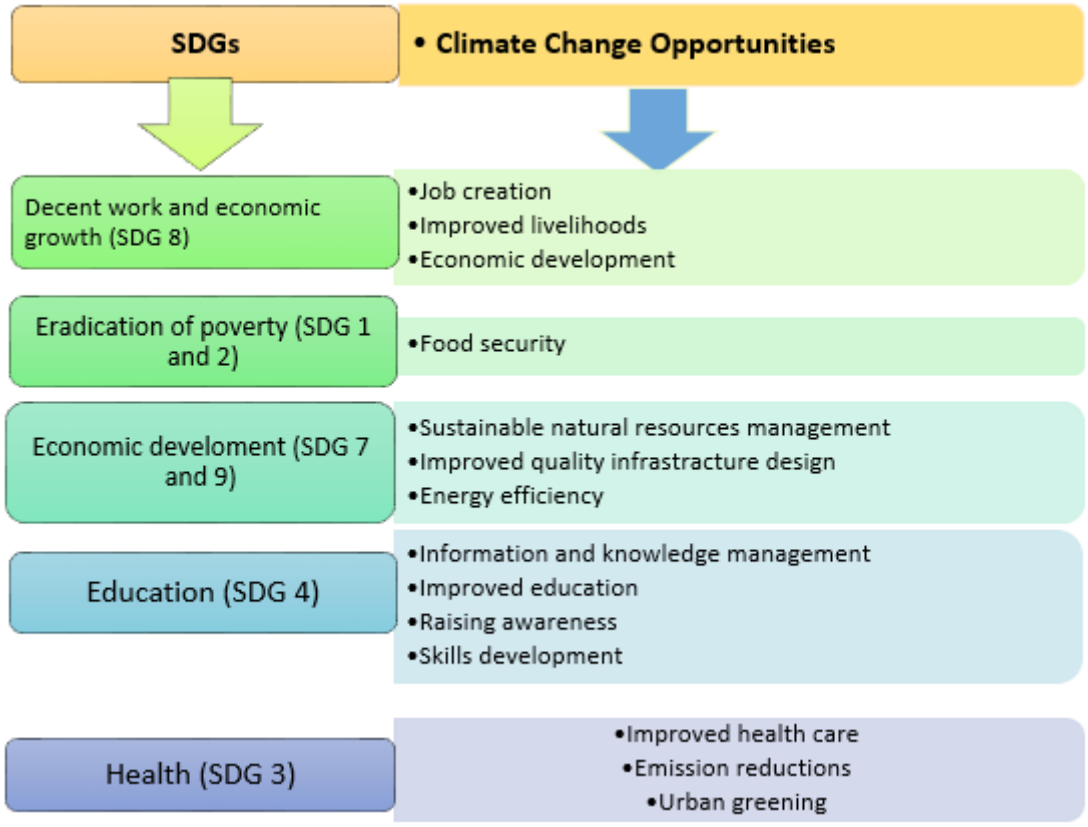
Referring to Table 4.6, the findings further indicate that in some cases the primary challenges have the same effects. Low prioritisation of climate resilience in municipalities is a knock-on effect of the lack of political will, insignificant contribution towards the overall performance, and lack of legislation for climate change. This finding correlates with the findings made by (Rosendo et al., 2018) that climate resilience is currently low prioritised in the plans and budget allocation at local government level of South Africa due to its insignificant contribution

towards the overall performance, insufficient political will, poor awareness, and poor understanding. In addition, the findings indicate that insufficient financial capacity for climate resilience is due to the classification of climate change as being an unfunded mandate, a deficiency of financial resources, and positioning of climate change under the least funded department in the municipal institutions, the environmental management department. In assertion of this view, Montmasson-Clair and Zwane (2016), and Hickmann and Stehle (2019) discovered that municipalities in South Africa do not receive financial or regulatory incentives to consider adaptation projects within planning. In view of this, the researcher is of the opinion that addressing these challenges requires a multi-faceted approach involving institutional reforms that will improve institutional coordination, increased financial resources, capacity building, enhanced public awareness, better data gathering and analysis, and the improvement of supportive policies and regulations.

The study objective was also interested in the lessons learned at municipal level. Referring to Table 4.7, the findings uncovered that there are several lessons learnt from adjusting to varying climate; for example, without capacity to implement, the policy framework for climate resilience is ineffective. In addition, awareness programmes for public and traditional leader's buy-in are important for the success of adaptation responses. The findings uncovered that traditional leader's and the community's buy-ins are crucial in accessing the indigenous knowledge. Be that as it may, local knowledge does not reflect in any climate resilience policy in the province. Similar findings were made in another part of the country, the Limpopo Province, by (Chikosi et al., 2019) that there is absence of indigenous knowledge in climate change policies and decision-making processes. This raises questions of how effective the awareness programmes are, and consultation sessions of climate resilience. In view of this, indigenous knowledge should inform adaptation actions, particularly in municipalities that are dominated by rural communities.

The objective was also interested in the opportunities presented by varying climate in the country. It was important to note that taking the opportunities presented by the changing climate is part of climate resilience. The findings uncovered that varying climate is accompanied by many opportunities in the country. Similar findings were made in Canada by Ogden and Innes (2008) that adaptation actions and sustainable development share common goals. Referring to Table 4.8, an argument arises that opportunities presented by variability in climate are connected to Sustainable Development Goals (SDGs). Figure 5.3 below demonstrates the link between the SDGs and the opportunities.

Figure 5. 3 Relationship between development goals and opportunities presented by climate change in South Africa.



Source: Based on field notes, (2021-2023)

The findings in Figure 5.3 indicate that the opportunities presented by climate change correspond to SDGs, and to the municipal and national government mandates, which are service delivery and the addressing of socioeconomic challenges such as job creation, eradication of poverty, economic development, education, and health care. Similar findings were made by Leal Filho et al., (2018) that a link is evident between climate resilience and socioeconomic growth. One can argue that the findings demonstrate that there is a need to educate the decision-makers in the developing countries in terms of how adaptation is an ally in addressing service delivery and socioeconomic challenges. This view is similar to that of Leck and Simon (2018), that climate change actions are constrained by the existing environmental-development rift in South Africa, although the environmental and development challenges are intertwined and co-dependent. In assertion of the view above, Sovacool et al., (2012) argue that adaptation actions that result in direct benefits to local population are more politically acceptable. In view of this, the notion of presenting adaptation as an ally of service delivery and sustainable development should be promoted and explored in the province and other parts of the country.

5.4 Appraisal of institutional adaptive capacity to climate change of municipalities in the Eastern Cape Province.

Another study interest was to scrutinise the evaluation of institutional coping mechanism to varying climate at the municipal level. The findings revealed that the evaluation of institutional coping mechanism is complicated by high variable climate and the unconducive environment for adaptation in the municipal institutions of the Eastern Cape Province. Similar findings were made in Chile by Patterson and Huitema (2019) that institutional coping mechanism is difficult to evaluate due to a high variety of adaptation challenges and context specific nature of impacts and coping mechanisms. Referring to Table 4.9, study findings revealed that there is a broad range of impacts in the different municipalities of the Eastern Cape Province. Additionally, the empirical evidence demonstrates that the effects vary not only from one municipality to the next, but these impacts differ drastically within a same municipality, especially in the district municipalities: in this case, Amathole and Chris Hani District Municipalities. Similar findings were made by Santhia et al., (2018) that the extremely inconstancy of climate across the province complicates the prediction of future climate change in the Eastern Cape. The wide range of impacts in district municipalities is expected due to the vast areas covered by these institutions.

A district municipality consists of several local municipalities, and that may also complicate the response plans because of the vast size of the area it covers. In assertion of this view, Ziervogel et al., (2014) uncovered that large municipalities struggle to implement adaptation measures due to size-related complexities. Different municipalities within a district may experience the same climate change impact; for instance, drought, but may require different techniques to adapt to it. It can be argued that, for instance, one area may have the natural resource (water) but needs to drill a borehole to access the water, whilst the other area within the same district may not have the natural resource at all, and the solution may be the transportation of water to the area. Therefore, understanding the impacts and appropriate responses for a specific area is crucial for adaptation. In view of this, similar to impacts, adaptation responses are context specific, as they can differ even within a municipality.

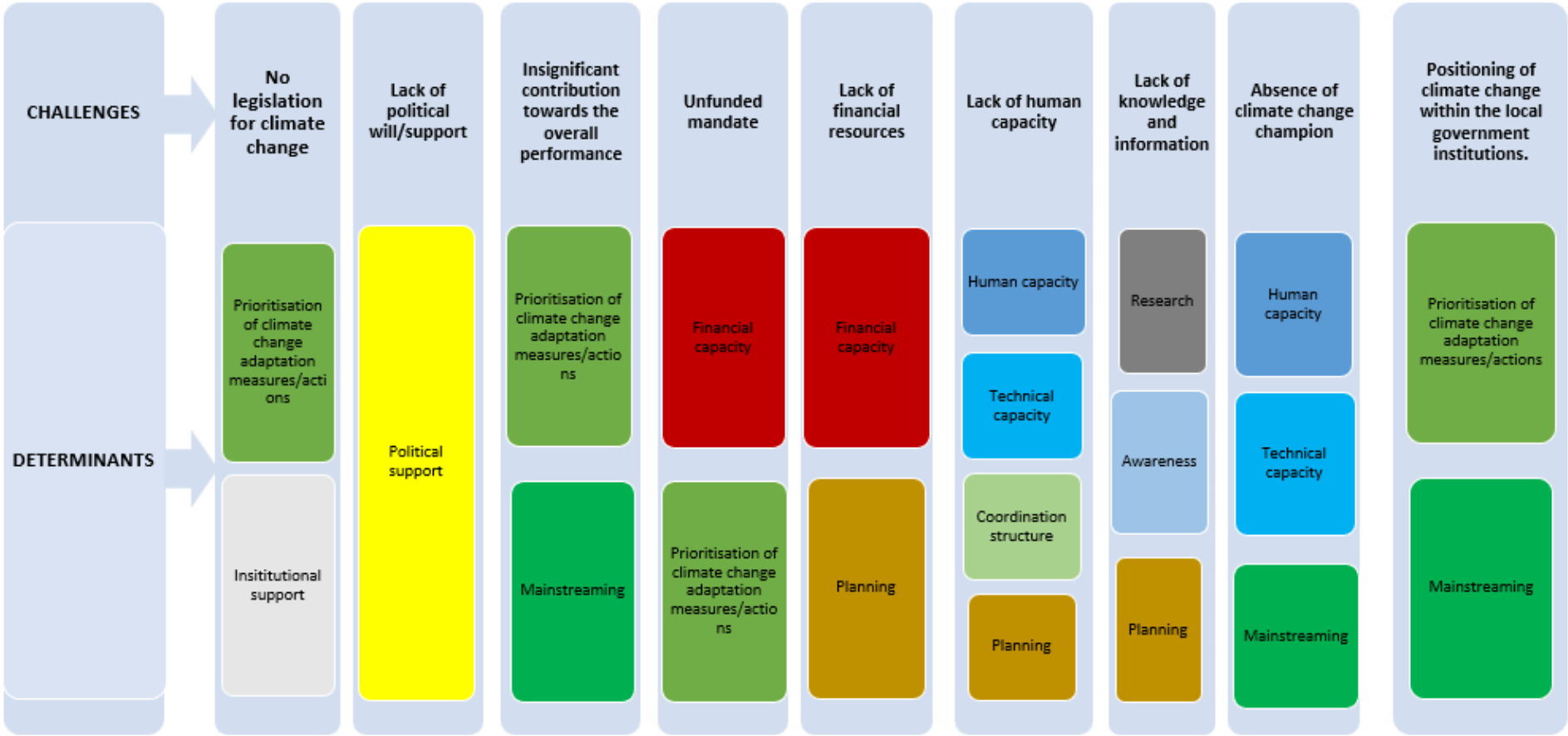
Referring to Table 4.11, Graph 4.7 and 4.8, the study findings revealed that institutional coping mechanism is barely evaluated at municipal level, mainly due to the absence of an enabling environment for adaptation. This finding correlates with the sentiments by Santhia et al., (2018)

that the country should invest innovative techniques at subnational institutions to create an enabling environment for climate resilience. Evaluation of the institutional coping mechanism is driven by the adequacy of the climate change governance. Therefore, challenges of adaptation are linked to the institution capacity; refer to Table 4.5. In essence, it will be very difficult to appropriately evaluate and monitor the institutional coping mechanism without addressing the challenges of climate resilience in municipalities.

Nonetheless, none of the primary challenges of adaptation are linked to the policy issue at the in municipities of the Eastern Cape Province. Therefore, the policies are either not a root cause of challenges or they are in place. This finding is similar to that of Olazabal and others (2019) that the existence of policies without action is ineffective on coping mechanism. In essence, the policies must be actioned to improve the institutional coping mechanism. In addition, adaptation challenges are linked to more than one type of adaptive capacity (research, human, financial and institutional setting); moreover, they are all connected to institutional setting. Therefore, good conditions for climate resilience are missing in the province. Corresponding sentiments were made by Santhia et al., (2018), that creation of conducive environment is required for effective climate resilience in the province. The adaptation challenges in the municipalities of the province can be addressed by institutional reforms that can enhance the institutional adaptive capacity. In view of this, it can be argued that the adequate evaluation of institutional coping mechanism at municipal level in the province is highly unlikely without institutional reforms that will create an enabling environment for coping strategies.

The complexities of the institutional adaptive capacity evaluation are further complicated by the link between the adaptation challenges and the determinants of institutional coping ability at municipal level. The findings demonstrates that the determinants, which are the inputs in an evaluation process of the institutional adaptive capacity, are difficult to assess at local municipal level due to the climate change adaptation challenges. Any results or outputs of a system or tool are as good and reliable as the inputs of a system. These views concur with the finding of Santhia et al., (2018) that the country should invest in creating good conditions for climate resilience at subnational institutions. The connection between the adaptation challenges and the determinants of institutional coping mechanism at municipal level is presented on Figure 5.4 below, which is based on Table 4.5 and 4.15.

Figure 5. 4 The relationship between the determinants for the evaluation of the adaptive capacity to climate change and the primary challenges of climate change adaptation at local government level.

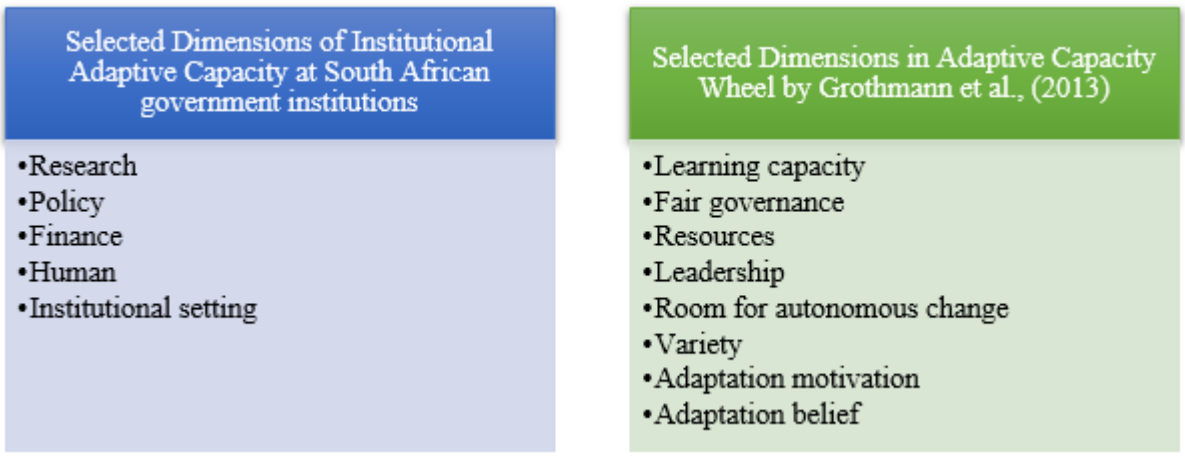


Source: Based on field notes (2021-2023)

The findings in Figure 5.4 demonstrate that adequate building and evaluation of institutional coping mechanism is complicated by the challenges of climate governance. In consideration of this, an argument can be raised that the current environment at local government level is not conducive to satisfactorily evaluate and monitor the institutional coping mechanism. This finding is similar to finding of Olazabal et al., (2019), that information gathered from the evaluation of adaptive capacity is essential to build capacity for future climate change impacts. In view of this, it will be irrational to build a system that can evaluate and monitor institutional adaptive capacity to climate change under the current unconducive environment at local government level. The climate governance challenges must be resolved first to construct a favourable conditions that would generate appropriate determinants of capacity for adequate evaluation of the institutional coping mechanism at municipal level.

With reference to Table 4.14 and 4.15, the findings revealed that there is no consensus in selection of determinants between the evaluation tools, respondents (technocrats) and the relevant climate change documents. Similar findings were made by Siders (2019) and Singh et al., (2022) that there are no standard determinants for institutional coping mechanism. The dimensions (indicators) and determinants selection at local government level was compared to the Adaptive Capacity Wheel (ACW) framework. The findings uncovered that there is a vast difference in selection of dimensions and determinants of institutional coping mechanism between South African government institutions and the academic literature. The differences in selection of dimensions are illustrated in figure 5.5 below.

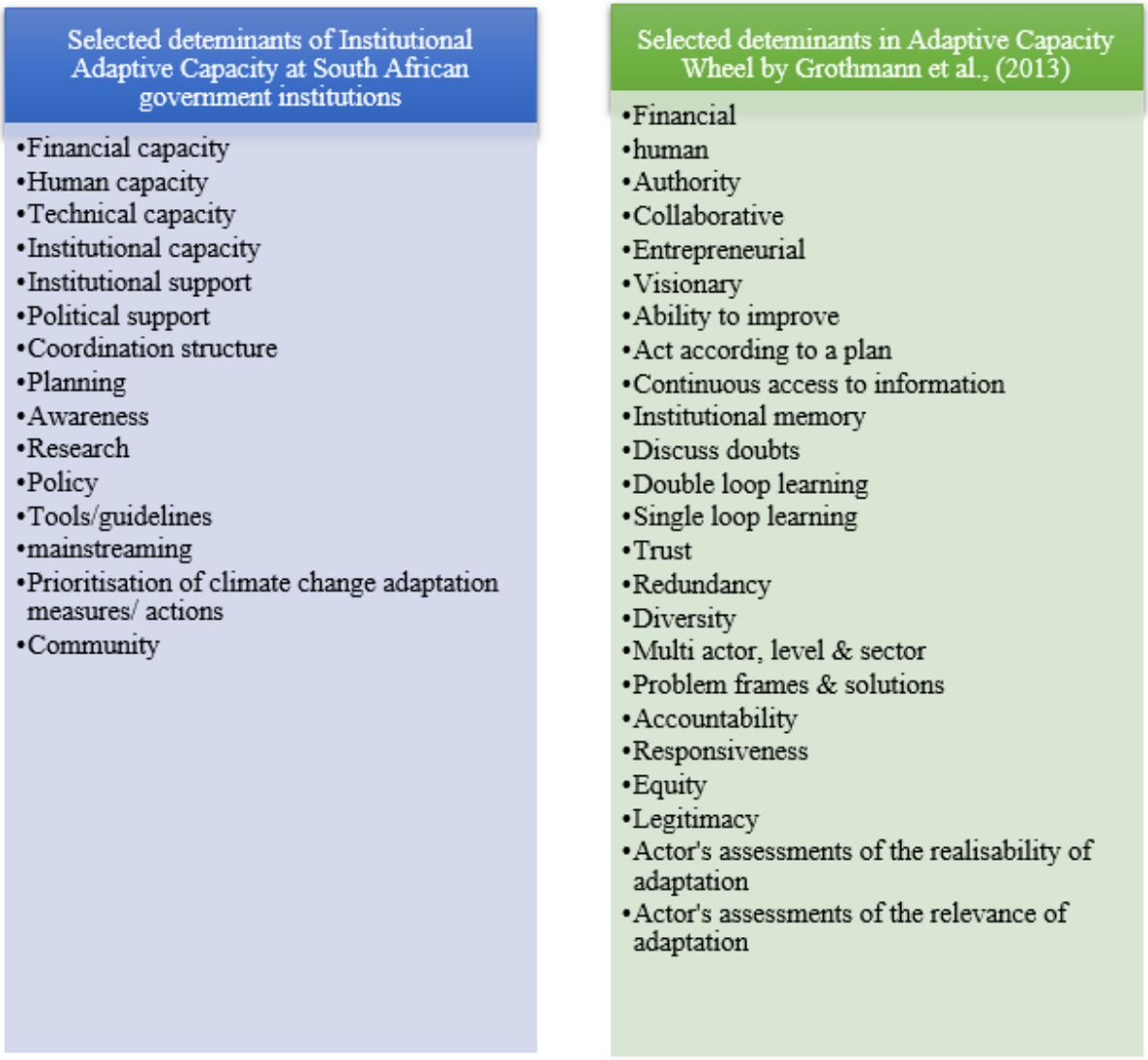
Figure 5. 5 Difference between the selected dimensions of institutional adaptive capacity by South African government institutions and Wheel of Adaptive Capacity



Source: Field base notes (2021-2023) and Grothmann et al., (2013)

The differences in the selection of determinants of the institutional adaptive capacity are demonstrated in figure 5.6 below.

Figure 5. 6 Difference between the selected dimensions of institutional adaptive capacity by South African government institutions and Wheel of Adaptive Capacity by Grothmann and others (2013)



Source: Based on field notes and (Grothmann et al., 2013)

The findings in Figure 5.5 and 5.6 uncovered that there is minimal cross referencing in the selection of dimensions and determinants of the institutional coping mechanism across government institutions and with academic literature. A similar finding was made by Siders (2019) that there is an insufficiency of collaboration and improvement of techniques in the evaluation of the climate coping mechanism discipline. It is understandable that adaptation is a localised activity, and the scenarios are different from different regions and institutions;

however, it is easier and valuable to use (or if needs be, derive your methods, dimensions and determinants from) the existing methods, dimensions and determinants to shift towards standardising and advancing evaluation of institutional coping mechanism and the field of climate resilience in general.

In view of this, there are already existing frameworks for an evaluation of institutional coping mechanism; for instance, the RRIA that was developed by Moser et al., (2010), and ACW that was developed by Guptas et al., (2010) and extended by Grothmann et al, (2013). The RRIA is a technique that was designed to evaluate the coping mechanism of institutions in poor urban communities. The Eastern Cape Province is dominated by local government municipalities that are mostly rural in nature, but the RRIA can be extended to accommodate the rural setting. In addition, the ACW is a useful framework for the selection of indicators and determinants of institutional coping mechanism. It can be applied as a standard framework to ensure that different local government institutions select their indicator and determinants of institutional adaptive capacity from the same pool. It must also be noted that current systems for the evaluation of adaptive capacity at local government in the province do not monitor, evaluate, mention how, or when the post-assessment results should be addressed. In view of this, it is necessary to address the results of evaluation quickly as they are fast outdated with changing institutional dynamics, socioeconomic factors, climate, and time.

5.5 The contribution to academic literature and impact of the study findings in the greater context of South Africa.

The study illustrates that development of a policy framework without consideration of the institutional ability to implement it, is another barrier to adaptive actions at the municipal level in Eastern Cape Province, and it might be the same scenario in other parts of South Africa. Consideration of institutional adaptive capacity during the development stage of the policy framework is critical as it indicates the intent to implement and shows the realistic expectation of level of success at implementation stage of the policy, strategy, or plans. In essence, the capacity of the institutions should be the foundation of the development of the policy to ensure that the policy is realistic and can be implemented successfully.

The study further shows that the SDGs and opportunities presented by climate change debates are intertwined. Thus, it is deemed important to present climate resilience as an ally in addressing SDGs and other pressing socioeconomic challenges. Additionally, the study

findings demonstrate the significance of including traditional leaders and the general community in adaptation to attain indigenous knowledge, particularly for municipalities dominated by rural areas in South Africa. Indigenous knowledge should be an integral part of the research, knowledge, and information in policy development and in the improvement and assessment of institutional coping mechanism. Therefore, indigenous knowledge should be among the indicators of research, which is usually one of the dimensions of the institutional coping mechanisms.

In addition, the study illustrates that high variable climate and institutional capacity challenges complicate an already complex process of assessing institutional coping mechanisms. The findings demonstrates the importance of addressing the climate governance challenges for the adequate evaluation of municipal coping mechanism in climate. Therefore, the municipalities of the Eastern Cape and the rest of South African local government institutions need to address the climate governance challenges to create a good platform for the evaluation of institutional coping mechanism. The assessment outcomes must be monitored and addressed before they are outdated. In essence, it is essential to quickly address the outcome of the evaluation of the coping mechanism as they are valid for a short period of time, and change rapidly with changing socioeconomic factors, climate, and time.

CHAPTER SIX
CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter concludes the study, and it is comprised of the study findings and recommendations about the subject of interest. It consists of three main sections drawn from the study. It commences with the summary of the main research outcomes and how they align with or deviate from the research questions that framed the research. The summaries of the study findings are specified, and their implications are scrutinized. The following section is the presentation of recommendations on the issues discussed to assist decision making processes on those matters. It highlights recommendations for researchers, academics, technocrats, and policy makers. The chapter concludes by presenting areas of possible future research informed by identified knowledge gaps.

Climate change governance data from various government institutions, particularly from local level, was examined to answer the research questions. The study used different methods, interviews, workshop, and secondary data analysis, to answer the research questions. Thematic analysis and policy content analysis were applied to analyse the data. The findings and their implications are summarised and presented below.

6.2.1 The role of policy framework in promoting the institutional adaptive capacity to climate change at local government level in the Eastern Cape Province.

The current climate resilient policy framework is well-defined with the key principles of multilevel governance structure designed to meet anticipated outcome. The South African climate change governance adopted the top-down approach, with DFFE as the leading institutions. The key findings that emanated from the interviews and our analysis of the framework demonstrates that the policy framework for climate resilience is in place at national and provincial level, and in most metropolitan and district institutions; however, most of local municipalities are either unwilling or do not have the capacity to develop and implement their own policy framework.

The study outcomes also demonstrate that the existing adaptation policies for government institutions in the Eastern Cape, including the provincial response strategy, are outdated,

generic and difficult to implement due to capacity challenges. In addition, the task of developing the existing policies, plans and/ or strategies was outsourced by almost all municipalities in this study with minimum inputs from the technocrats of the government institutions. Therefore, capacity challenges are prominent at local government, and that affects the adaptation to climate change of the institutions. In addition, the coping strategies are the products of the consultants with minimal local or indigenous expertise and are often difficult to implement by considering the local context.

Furthermore, as mentioned before, the coping strategies are developed in a generic method, and that has resulted in non-consideration of the institutional capacity during the development stage of the policy documents. This highlights the unpreparedness to implement the climate change policy. Additionally, the coping strategies emphasise the importance of improving the coping mechanism; however, there is no clear plan on how the institutional adaptive capacity at local government level will be enhanced. Therefore, the promotion of institutional adaptive capacity by policy framework is minimal in the municipalities of the Eastern Cape Province.

6.2.2 Barriers, challenges, lessons, and opportunities of adapting to climate change at municipal level in South Africa.

Even though, to some level, there are policies in place, the lack of an enabling environment to implement these policies creates numerous challenges for climate resilience in municipalities. These challenges are interconnected to each other, thus in some instances, they have the same knock- on effects. The lack of knowledge and information is at the centre of adaptation challenges. The lack of knowledge and information to inform the decision-makers (politicians) results in the lack of political will and absence of legislation. Subsequently, the adaptation actions are positioned in the peripherals of the institution, with minimal resources.

There are several lessons of climate change governance that were learnt at municipality level in Eastern Cape. To begin with, the policy framework for climate change is futile without sufficient institutional capacity to implement it. In addition, traditional leader's and the community's buy-ins are crucial for acceptance of the adaptation measures and accessing the indigenous knowledge. Indigenous knowledge should be part of the knowledge and information that inform the policy and coping mechanism in municipalities.

The opportunities that are presented by climate change at the study site align with the SDGs. For this reason, climate change should not be viewed as another issue that competes with other

pressing challenges (unemployment, poverty, to name a few) for resources at local government level. The addressing of climate change should be presented as an alliance that can assist in solving the pressing issues at local government level, and subsequently, the realisation of SDGs in South Africa.

6.2.3 Evaluation of institutional adaptive capacity to climate change at local government level in Eastern Cape.

Evaluation of the institutional adaptive capacity is regarded as the vital step of adaptation in Eastern Cape. However, the evaluation of institutional coping mechanism to varying climate is a by-product of the evaluation of the institution's level of vulnerability in the Eastern Cape. In addition, there are few local government institutions that assess their level of resilience to varying climate. Therefore, there is an absence of a reliable system for evaluation of institutional coping mechanism of municipalities. As a result, it is difficult to compare the coping ability of different municipalities, understand which institution needs assistance the most, and adequately allocate resources.

Challenges of climate change governance in municipalities complicate the evaluation of institutional coping mechanism. The lack of legislation and insignificant contribution to the overall performance of the municipalities result in low prioritisation of adaptation activities. Evaluation of institutional coping mechanism is a complex assignment; there is no legislation that compels municipalities to action coping strategies, and activities of climate resilience contributes an insignificant percentage to the overall performance of the institution. Therefore, the current environment at local government level makes it irrational to prioritise the evaluation of institutional coping mechanism to varying climate.

Addition, the primary adaptation challenges are linked to the determinants of the institutional coping mechanism. The institutional and capacity challenges of adaptation are intertwined with the determinants of the institutional coping mechanism. As a results, there is an unconducive environment for the measurement of institutional coping mechanism in municipalities. Therefore, it is almost impossible to adequately evaluate the institutional adaptive capacity before addressing the challenges of adaptation at municipal level of the Eastern Cape Province. Additionally, there is no consistency in the terminology and the selection of the determinants of institutional coping mechanism within the South African government institutions.

6.2.4 Implications of the findings, in the greater context of South Africa.

The research demonstrates the presence and limits of the policy structure for climate resilience in South Africa. The policy framework is present at national and provincial level and, to some extent of local government level (metropolitan and district); however, it is almost non-existent at local municipalities.

The institutional and capacity challenges of climate change governance create an unconducive environment for climate resilience in the municipalities of the Eastern Cape Province, and possibly in other areas of the country. The institutional and capacity challenges undermine and complicate the climate resilience. Inevitably, the challenges undermine and complicate the process of evaluation of institutional adaptive capacity to varying climate in South African municipalities.

One of the key messages coming out of this study is the importance to adequately capacitate local government institutions as they are at the forefront of combating impacts of climate change. The study illustrates that it is necessary to evaluate and monitor the adaptive capacity of municipalities for adequate budget allocation and to ensure that none of the local government institutions is left behind in climate change adaptation.

6.3 Recommendations

The research proposes various recommendations to advance climate change governance, particularly the appraisal of institutional coping mechanism in municipalities of South Africa. The study findings demonstrate that the policy framework for climate resilience is present at metropolitan and district municipalities, however, it is almost non-existent in local municipalities. The study also highlighted adaptation challenges in municipal institutions of the Eastern Cape Province. These challenges are accompanied by lessons and, opportunities that are related to the SDGs and socioeconomic development activities. The adaptation challenges and the high variable climate, complicate the appraisal of institutional coping mechanism to varying climate in the province. Therefore, institutional and capacity challenges need to be addressed first, to adequately evaluate the preparedness of municipalities.

The following are recommendations from the study:

i. Consideration should be made to ensure that all local government institutions develop and implement a policy framework for climate resilience. The NCCR

policy requires all government institutions to have a policy for climate change, including all (more than 200) the local government municipalities.

ii. Consideration should be made to ensure that local government institutions have sufficient capacity to develop their coping strategies. Development of coping strategy is an important step of climate resilience; nonetheless, the task is outsourced by almost all municipalities in South Africa due to the lack of capacity within the institutions. This is a major flaw of the policy framework for climate resilience in the country. The climate resilience policy should be developed within the municipality, to ensure that the policy is internalised across the institution. The policy that is understood and adopted by the entire institution is easier to implement than a policy that is developed by a third party.

iii. The capacity of the institutions should be considered during the development of their policy for climate change adaptation. At present, most municipal institutions develop their policy in a generic manner; as a result, they struggle to implement it due to institutional adaptive capacity issues. Therefore, it is advisable that the capacity of the institution should be the foundation for the development of the coping strategy. This will ensure that the set goals of the policy are realistic and achievable.

iv. There is a need to introduce institutional reforms with the sole purpose of minimising and eventually eliminating the challenges of climate change governance in municipalities. The current structure of local government institution is not conducive for climate resilience; and that is highlighted by low prioritisation and minimal resource allocations for adaptation. The South African government institutions should consider a multi-faceted approach involving an increase in political will and support, improved institutional coordination, increased financial resources, capacity building, enhanced public awareness, better data collection and analysis, and the passing of legislation for climate resilience.

v. The study illustrates the significance of local knowledge in climate resilience. Therefore, it is necessary to ensure that indigenous knowledge contributes to formation of coping strategies, particularly municipalities that are dominated by rural areas. Therefore, local knowledge should reflect in coping strategies and actions.

vi. Considerations should be made on how to present coping mechanism as an ally in addressing service delivery and SDGs. This will ensure that adaptation stands a

better chance of being accepted and incorporated by decision-makers when it is presented as an ally in responding to pressing issues at local government level, rather than an activity that competes for resources at local government level.

vii. There is a need for a development of a system that can evaluate and monitor the institutional coping mechanism to varying climate of municipalities. The system should be able to track the progress of activities, compare the institutional adaptive capacity of all municipalities, and assist in allocation of resources in climate resilience. Currently, there is no criteria that is used by institutions at a higher level to allocate available resources to municipalities for climate resilience. Thus, there is a need for a system that can identify municipalities that have weak institutional coping mechanism in South Africa, so that they can be prioritised accordingly when there is an availability of resources.

6.4 Future Research

Considering the findings of the research, suggestions of future research are presented below.

i. Future research could examine the possibility of developing a system/ tool that can assess and monitor (dashboard) the institutional coping mechanism of government and private institutions in South Africa. This is because institutions are important in climate resilience of a region.

ii. Upcoming research that investigates the level of involvement of municipalities and communities in adaptation projects by NGO's would be beneficial. This would shed light on visions, powers, and levels of involvement of different shareholders in climate resilience field.

iii. Future research that explores the financing of climate resilience is needed. Although the importance of climate resilience is highly researched and the lack of capacity is highly cited, there is minimal research that focuses on how to finance climate resilience.

iv. Upcoming studies on development of a model that integrates the climate impacts and best response options in developing countries is necessary. This would assist in developing the best framework that can map out the best way to build coping mechanism for a community, institution, or region.

REFERENCES LIST

Abdul-Razak, M. and Kruse, S., 2017. The adaptive capacity of smallholder farmers to climate change in the Northern Region of Ghana. *Climate Risk Management*, Vol.17, pp.104-122. https://doi.org/10.1016/j.crm.2017.06.001

Abegunde, V.O., Sibanda, M. and Obi, A., 2019. The dynamics of climate change adaptation in Sub-Saharan Africa: A review of climate-smart agriculture among small-scale farmers. *Climate*, 7(11), p.132. https://www.mdpi.com/2225-1154/7/11/132#

Acemoglu, D., Johnson, S. and Robinson, J.A., 2005. Institutions as a fundamental cause of long-run growth. Handbook of economic growth, Vol.1, Part A, pp.385-472. https://doi.org/10.1016/S1574-0684(05)01006-3

Acharya, A.S., Prakash, A., Saxena, P. and Nigam, A., 2013. Sampling: Why and how of it. *Indian Journal of Medical Specialties*, 4(2), pp.330-333. http://dx.doi.org/10.7713/ijms.2013.0032

Adams, R.M., Hurd, B.H., Lenhart, S. and Leary, N., 1998. Effects of global climate change on agriculture: an interpretative review. *Climate research*, 11(1), pp.19-30. https://www.int-res.com/articles/cr1998/11/c011p019.pdf

Adger, W.N., Huq, S., Brown, K., Conway, D. and Hulme, M., 2003. Adaptation to climate change in the developing world. *Progress in development studies*, 3(3), pp.179-195. https://doi.org/10.1191/1464993403ps060oa

Adom, R.K., Simatele, M.D., Das, D.K., Mukalazi, K.A., Sonwabo, M., Mudau, L., Sithole, M., Kubanza, S., Vogel, C. and Zhou, L., 2023. Enhancing climate change adaptation governance through transforming institutions in Kwa-Zulu Natal Province, South Africa. *International Journal of Climate Change Strategies and Management*, 69(1), pp1756-8692. https://doi.org/10.1108/IJCCSM-12-2022-0157

Agrawal, A. and Perrin, N. 2009. Climate Adaptation, Local Institutions and Rural Livelihoods. In: Adger, W.N., Lorenzoni, I. and O'Brien, K., Eds., *Adapting to Climate Change: Thresholds, Values, Governance*. pp.350-367 Cambridge University Press, Cambridge, UK.

Agrawal, A., 2008. The role of local institutions in adaptation to climate change. In: International Forestry Resources and Institutions Program, Working Paper, #W081-3. MI: University of Michigan, Ann Arbor. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Agrawal%2C+A.%2C+2008.+The+role+of+local+institutions+in+adaptation+to+climate+change.+In%3A+International+Forestry+Resources+and+Institutions+Program%2C+Working+Paper%2C+%23W081-3.+MI%3A+University+of+Michigan%2C+Ann+Arbor&btnG= (Accessed 25/05/2023)

Alexandra, J., 2017. Risks, uncertainty, and climate confusion in the Murray–Darling Basin reforms. *Water Economics and Policy*, 3(03), p.1650038. https://doi.org/10.1142/S2382624X16500387

Alhojailan, M.I. Thematic Analysis: A Critical Review of Its Process and Evaluation. WEI Int. Eur. Acad. Proc. 2012, 1, 8–21. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=0c66700a0f4b4a0626f87a3692d4f34e599c4d0e. (Accessed 10/11/23)

Amaru, S. and Chhetri, N.B., 2013. Climate adaptation: Institutional response to environmental constraints, and the need for increased flexibility, participation, and integration of approaches. *Applied Geography*, 39, pp.128-139.https://doi.org/10.1016/j.apgeog.2012.12.006

Amathole District Municipality. 2011. Amathole District Municipality Climate Change Vulnerability Assessment and Response Framework. East London. https://drive.google.com/uc?export=download&id=0B98u4HJRN5rrajVoVThQZzFyZnc&quot. (Accessed 16/03.22)

Amundsen, H., Hovelsrud, G.K., Aall, C., Karlsson, M. and Westskog, H., 2018. Local governments as drivers for societal transformation: Towards the 1.5 C ambition. *Current*

Opinion in Environmental Sustainability, 31, pp.23-29. https://doi.org/10.1016/j.cosust.2017.12.004

Aoki, M., 2007. Endogenizing institutions and institutional changes. *Journal of institutional economics*, 3(1), pp.1-31. https://doi.org/10.1017/S1744137406000531

Aron, J., 2000. Growth and institutions: a review of the evidence. *The world Bank research observer*, 15(1), pp.99-135. https://doi.org/10.1093/wbro/15.1.99

Artur, L. and Hilhorst, D., 2012. Everyday realities of climate change adaptation in Mozambique. *Global Environmental Change*, 22(2), pp.529-536. https://doi.org/10.1016/j.gloenvcha.2011.11.013

Arya, B. and Zhang, G., 2009. Institutional reforms and investor reactions to CSR announcements: Evidence from an emerging economy. *Journal of management studies*, 46(7), pp.1089-1112. https://doi.org/10.1111/j.1467-6486.2009.00836.x

Averchenkova, A., Gannon, K.E. and Curran, P., 2019. Governance of climate change policy: A case study of South Africa. *Grantham Research Institute on Climate Change and the Environment Policy Report*, pp.1-39. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2019/06/GRI_Governance-of-climate-change-policy_SA-case-study_policy-report_40pp.pdf. (Accessed 15/03/2023)

Ayers, J. and Huq, S., 2009. Community-based adaptation to climate change: an update. *Policy Pointers*. International Institute for Environment and Development, London. https://www.iied.org/sites/default/files/pdfs/migrate/17064IIED.pdf. (Accessed 05/06/2022)

Aylett, A., 2015. Institutionalizing the urban governance of climate change adaptation: Results of an international survey. *Urban Climate*, 14, pp.4-16. https://doi.org/10.1016/j.uclim.2015.06.005.

Backeberg, G.R., 2005. Water institutional reforms in South Africa. *Water policy*, 7(1), pp.107-123. https://doi.org/10.2166/wp.2005.0007

Bai, X., Dawson, R.J., Ürge-Vorsatz, D., Delgado, G.C., Salisu Barau, A., Dhakal, S., Dodman, D., Leonardsen, L., Masson-Delmotte, V., Roberts, D.C. and Schultz, S., 2018. Six research priorities for cities and climate change. *Nature*, 555(7694), pp.23-25. *doi:* https://doi.org/10.1038/d41586-018-02409-z

Bailey, I., and Wilson, G.A., 2009. Theorising transitional pathways in response to climate change: techno-centrism, ecocentrism, and the carbon economy. *Environment and planning A*, 41(10), pp.2324-2341. https://doi.org/10.1068/a40342.

Baiocchi, G., Heller, P. and Silva, M.K., 2008. Making space for civil society: institutional reforms and local democracy in Brazil. *Social Forces*, 86(3), pp.911-936. https://doi.org/10.1353/sof.0.0015.

Baker, I., Peterson, A., Brown, G. and McAlpine, C., 2012. Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. *Landscape and urban planning*, 107(2), pp.127-136. https://doi.org/10.1016/j.landurbplan.2012.05.009.

Ball, S.J., 1993. What is policy? Texts, trajectories, and toolboxes. *The Australian Journal of Education Studies*, 13(2), pp.10-17. https://doi.org/10.1080/0159630930130203.

Baron, M.A., 2008. Guidelines for writing research proposals and dissertations. *Division of Educational Administration: University of South Dakota*, Vol.1, pp.1-52. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Baron%2C+M.A.%2C+2008.+Guidelines+for+writing+research+proposals+and+dissertations.+Division+of+Educational+Administration%3A+University+of+South+Dakota%2C+1%2C+pp.1-52.&btnG= . (Accessed 03/04/2023).

Baudoin, M.A. and Ziervogel, G., 2017. What role for local organisations in climate change adaptation? Insights from South Africa. *Regional Environmental Change*, 17, pp.691-702. https://doi.org/10.1007/s10113-016-1061-9.

Benatar, S.R., 2002. Reflections and recommendations on research ethics in developing countries. *Social science & medicine*, 54(7), pp.1131-1141. https://doi.org/10.1016/S0277-9536(01)00327-6.

Berhanu, M. and Wolde, A.O., 2019. Review on climate change impacts and its adaptation strategies on food security in Sub-Saharan Africa. *Agricultural Socio-Economics Journal*, 19(3), pp.145-154. http://dx.doi.org/10.21776/ub.agrise.2019.019.3.3.

Berke, P. and Lyles, W., 2013. Public risks and the challenges to climate-change adaptation: A proposed framework for planning in the age of uncertainty. *Cityscape*, Cityscape: A Journal of Policy Development and Research, 15(1), pp.181-208. https://www.jstor.org/stable/41958963

Berkhout, F., 2012. Adaptation to climate change by organizations. *Wiley interdisciplinary reviews: climate change*, 3(1), pp.91-106. https://doi.org/10.1002/wcc.154.

Beunen, R. and Patterson, J.J., 2019. Analysing institutional change in environmental governance: Exploring the concept of 'institutional work'. *Journal of Environmental Planning and Management*, 62(1), pp.12-29. https://doi.org/10.1080/09640568.2016.1257423.

Biesbroek, R., 2021. Policy integration and climate change adaptation. *Current Opinion in Environmental Sustainability*, 52, pp.75-81. https://doi.org/10.1016/j.cosust.2021.07.003.

Birchall, S.J. and Bonnett, N., 2021. Climate change adaptation policy and practice: The role of agents, institutions, and systems. *Cities*, 108, p.103001. https://doi.org/10.1016/j.cities.2020.103001.

Björnberg, K.E., Karlsson, M., Gilek, M. and Hansson, S.O., 2017. Climate and environmental science denial: A review of the scientific literature published in 1990–2015. *Journal of Cleaner Production*, 167, pp.229-241. https://doi.org/10.1016/j.jclepro.2017.08.066.

Boeri, T., 2011. Institutional Reforms in European Labour Markets. In Ashenfelter, O and D. Card, (eds)., *Handbook of Labor Economics*, Vol. 4B, pp. 1173–236. Elsevier B.V., Amsterdam. https://eml.berkeley.edu/~cle/secnf/boerislides.pdf. (Accessed 27/10/2924)

Boko, M., Niang, I., Nyong, A., Vogel, C., Githeko, A., Medany, M., Osman-Elasha, B., Tabo, R. and Yanda, P. 2007. Africa. In: Parry, M.L., Canziani, O.F., Palutikof, J.P., Linden, P.J. van der and Hanson, C.E., Eds., 2007. *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Pp.433-467. Cambridge University Press, Cambridge, UK.

Bourke, B., 2014. Positionality: Reflecting on the research process. *The qualitative report*, 19(33), pp.1-9. https://doi.org/10.46743/2160-3715/2014.1026.

Bowen, G.A., 2005. Preparing a qualitative research-based dissertation: Lessons learned. *The qualitative report*, 10(2), pp.208-222. https://nsuworks.nova.edu/tqr/vol10/iss2/2/.

Boyatzis, R.E., 1998. *Transforming qualitative information: Thematic analysis and code development*. Thousand Oaks, CA: Sage. https://books.google.co.za/books?hl=en&lr=&id=_rfClWRhIKAC&oi=fnd&pg=PR6&dq=Boyatzis,+R.E.,+1998.+Transforming+qualitative+information:+Thematic+analysis+and+code+development.+Thousand+Oaks,+CA:+Sage.&ots=ECnMygii7m&sig=8aFkRiA9BpO63Re3FQ0gKwWDx4Y&redir_esc=y#v=onepage&q=Boyatzis%2C%20R.E.%2C%201998.%20Transforming%20qualitative%20information%3A%20Thematic%20analysis%20and%20code%20development.%20Thousand%20Oaks%2C%20CA%3A%20Sage.&f=false. (Accessed 12/06/2023).

Braun, V. and Clarke, V., 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), pp.77-101. https://doi.org/10.1191/1478088706qp063oa

Brockhaus, M., Djoudi, H. and Kambire, H., 2012. Multi-level governance and adaptive capacity in West Africa. *International Journal of the Commons*, 6(2), pp. 200-232. https://www.jstor.org/stable/26523102

Brown, H.C.P., Sonwa, D.J.. 2015. Rural local institutions and climate change adaptation in forest communities in Cameroon. *Ecology and Society*, 20 (2): 6. http://dx.doi.org/10.5751/ES-07327-200206

Bunnin, N. and Tsui-James, E. eds., 2003. *The Blackwell companion to philosophy*. Oxford. John Wiley & Sons. https://books.google.co.za/books?hl=en&lr=&id=I6-6rLppi7sC&oi=fnd&pg=PR9&dq=Bunnin,+N.+and+TsuiJames,+E.+eds.,+2003.+The+Blackwell+companion+to+philosophy.+Oxford.+John+Wiley+%26+Sons.+&ots=oiywulMLvl&sig=yBAZ5ZBeOGU8Il4pwWbSUbJ7SxQ&redir_esc=y#v=onepage&q=Bunnin%2C%20N.%20and%20TsuiJames%2C%20E.%20eds.%2C%202003.%20The%20Blackwell%20companion%20to%20philosophy.%20Oxford.%20John%20Wiley%20%26%20Sons.&f=false. (Accessed 11/08/2023).

Burns, N. and Grove, S.K., 2003. Understanding nursing research, Philadelphia. *PA: Saunders*. https://books.google.co.za/books?hl=en&lr=&id=Y9T3QseoHiYC&oi=fnd&pg=PP1&dq=Burns,+N.+and+Grove,+S.K.,+2003.+Understanding+nursing+research,+Philadelphia.+PA:+Saunders.&ots=_tWcX8G8_J&sig=gpD_82P0AxkFfP_bBX4VjOhGHk&redir_esc=y#v=onepage&q=Burns%2C%20N.%20and%20Grove%2C%20S.K.%2C%202003.%20Understanding%20nursing%20research%2C%20Philadelphia.%20PA%3A%20Saunders.&f=false. (Accessed 17/07/2023)

Busayo, E.T. and Kalumba, A.M., 2021. Recommendations for linking climate change adaptation and disaster risk reduction in urban coastal zones: Lessons from East London, South Africa. *Ocean & Coastal Management*, 203, p.105454. https://doi.org/10.1016/j.ocecoaman.2020.105454

Carmin, J., Anguelovski, I. and Roberts, D., 2012. Urban climate adaptation in the global south: planning in an emerging policy domain. *Journal of planning education and research*, 32(1), pp.18-32. https://doi.org/10.1177/0739456X11430951

Cartwright, A., Blignaut, J., De Wit, M., Goldberg, K., Mander, M., O'Donoghue, S. and Roberts, D., 2013. Economics of climate change adaptation at the local scale under conditions of uncertainty and resource constraints: the case of Durban, South Africa. *Environment and Urbanization*, 25(1), pp.139-156. https://doi.org/10.1177/0956247813477814

Chersich, M.F. and Wright, C.Y., 2019. Climate change adaptation in South Africa: a case study on the role of the health sector. *Globalization and health*, 15(1), pp.1-16. https://doi.org/10.1186/s12992-019-0466-x

Chersich, M.F., Wright, C.Y., Venter, F., Rees, H., Scorgie, F. and Erasmus, B., 2018. Impacts of climate change on health and wellbeing in South Africa. *International journal of environmental research and public health*, 15(9), p.1884. https://doi.org/10.3390/ijerph15091884

Chikosi, E.S., Mugambiwa, S.S., Tirivangasi, H.M. and Rankoana, S.A., 2019. Climate change and variability perceptions in Ga-Dikgale community in Limpopo Province, South Africa. *International Journal of Climate Change Strategies and Management*, 11(3), pp.392-405. https://doi.org/10.1108/IJCCSM-01-2018-0004

Chong, A. and Gradstein, M., 2007. Inequality and institutions. *The review of Economics and Statistics*, 89(3), pp.454-465. https://doi.org/10.1162/rest.89.3.454

Corry, O. and Jørgensen, D., 2015. Beyond 'deniers' and 'believers': Towards a map of the politics of climate change. *Global Environmental Change*, 32, pp.165-174. https://doi.org/10.1016/j.gloenvcha.2015.01.006

Cousin G., 2010. Positioning positionality: The reflexive turn. In Savin-Baden M., Howell Major C. (Eds.), *New approaches to qualitative research: Wisdom and uncertainty* (pp. 9–18). Routledge.

Coyne, I.T., 2008. Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? *Journal of advanced nursing*, 26(3), pp.623-630. https://doi.org/10.1046/j.1365-2648.1997.t01-25-00999.x

Dale, A., Robinson, J., King, L., Burch, S., Newell, R., Shaw, A. and Jost, F., 2020. Meeting the climate change challenge: local government climate action in British Columbia, Canada. *Climate Policy*, 20(7), pp.866-880. https://doi.org/10.1080/14693062.2019.1651244

Dannevig, H., Hovelsrud, G.K. and Husabø, I.A., 2013. Driving the agenda for climate change adaptation in Norwegian municipalities. *Environment and Planning C: Government and Policy*, 31(3), pp.490-505. https://doi.org/10.1068/c1152

Dannevig, H., Rauken, T. and Hovelsrud, G., 2012. Implementing adaptation to climate change at the local level. *Local Environment-The International Journal of Justice and Sustainability*17(6-7), pp.597-611. https://doi.org/10.1080/13549839.2012.678317

De Lucia, V., 2017. Beyond anthropocentrism and ecocentrism: a biopolitical reading of environmental law. *Journal of Human Rights and the Environment*, 8(2), pp.181-202. https://doi.org/10.4337/jhre.2017.02.01

Department of Environmental Affairs. 2011. *National Climate Change Response White Paper of South Africa*. https://www.dffe.gov.za/sites/default/files/legislation/2023-09/national_climatechange_response_whitepaper_0.pdf (Accessed 10/03/2023)

Department of Economic Development and Environmental Affairs. 2011. *Eastern Cape Climate Change Response Strategy*. https://letsrespondtoolkit.org/wp-content/uploads/2021/09/Provincial-Strategy-E-Cape-2011.pdf. (Accessed 13/05/2023)

Department of Environmental Affairs. 2012. *Climate Change Let's Respond Toolkit*. https://letsrespondtoolkit.org/resources/vulnerability-assessment-tool/.(Accessed 17/02/2023)

Department of Statistics South Africa. 2022. *Census 2022*. https://census.statssa.gov.za/#/province/2/2. (Accessed 08/06/2023)

Dickerson, A., 2020. Ecocentrism, economics and commensurability. *The Ecological Citizen*, 3 (Suppl B), pp.5-11. https://www.ecologicalcitizen.net/pdfs/v03sb-01.pdf. (Access 17/09/2022)

Di Gregorio, M., Fatorelli, L., Paavola, J., Locatelli, B., Pramova, E., Nurrochmat, D.R., May, P.H., Brockhaus, M., Sari, I.M. and Kusumadewi, S.D., 2019. Multi-Level Governance and Power in Climate Change Policy Networks. *Global Environmental Change*, 54, pp.64-77. https://doi.org/10.1016/j.gloenvcha.2018.10.003

Dodman, D. and Mitlin, D., 2015. The National and Local Politics of Climate Change Adaptation in Zimbabwe. *Climate and Development*, 7(3), pp.223-234. https://doi.org/10.1080/17565529.2014.934777

Donnelly, B. and Bishop, P., 2007. Natural Law and Ecocentrism. *Journal of Environmental Law*, 19(1), pp.89-101. https://doi.org/10.1093/jel/eql039

Dube, K., Nhamo, G. and Chikodzi, D., 2022. Climate Change-Induced Droughts and Tourism: Impacts and Responses of Western Cape Province, South Africa. *Journal of Outdoor Recreation and Tourism*, 39, Art 100319, pp. 1-10. https://doi.org/10.1016/j.jort.2020.100319

Dutra, L.X., Sporne, I., Haward, M., Aswani, S., Cochrane, K.L., Frusher, S., Gasalla, M.A., Gianesella, S.M., Grant, T., Hobday, A.J. and Jennings, S., 2019. Governance Mapping: A Framework for Assessing the Adaptive Capacity of Marine Resource Governance to Environmental Change. *Marine Policy*, 106, Art 103392. Pp. 1-3 https://doi.org/10.1016/j.marpol.2018.12.011

Elum, Z.A., Modise, D.M. and Marr, A., 2017. Farmer's Perception of Climate Change and Responsive Strategies in Three Selected Provinces of South Africa. *Climate Risk Management*, 16, pp.246-257. https://doi.org/10.1016/j.crm.2016.11.001

Emetumah, F.C., 2017. Modern Perspectives on Environmentalism: Ecocentrism and Techno-centrism in the Nigerian context. *Asian Research Journal of Arts & Social Sciences*, 2(4), pp.1-9. https://doi.org/10.9734/ARJASS/2017/32821

England, K.V., 1994. Getting personal: Reflexivity, Positionality, and Feminist Research. *The Professional Geographer*, 46(1), pp.80-89. https://doi.org/10.1111/j.0033-0124.1994.00080.x

Englander, M., 2012. The Interview: Data Collection in Descriptive Phenomenological Human Scientific Research. *Journal of Phenomenological Psychology*, 43(1), pp.13-35. https://doi.org/10.1163/156916212X632943

Engle, N.L., 2011. Adaptive Capacity and its Assessment. *Global Environmental Change*, 21(2), pp.647-656. https://doi.org/10.1016/j.gloenvcha.2011.01.019

Etikan, I., Musa, S.A. and Alkassim, R.S., 2016. Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), pp.1-4. https://doi.org/10.11648/j.ajtas.20160501.11

Faling, W., Tempelhoff, J.W. and Van Niekerk, D., 2012. Rhetoric or Action: Are South African Municipalities Planning for Climate Change? *Development Southern Africa*, 29(2), pp.241-257. https://doi.org/10.1080/0376835X.2012.675695

Fila, D., Fünfgeld, H. and Dahlmann, H., 2023. Climate Change Adaptation with Limited Resources: Adaptive Capacity and Action in Small- and Medium-Sized Municipalities. *Environment, Development and Sustainability*, 26(3), pp.1-21. https://doi.org/10.1007/s10668-023-02999-3

Fu, Y., Grumbine, R.E., Wilkes, A., Wang, Y., Xu, J.C., and Yang, Y.P., 2012. Climate Change Adaptation Among Tibetan Pastoralists: Challenges in Enhancing Local Adaptation Through Policy Support. *Environmental Management*, 50(4), pp.607-621. https://doi.org/10.1007/s10668-023-02999-3

Garg, R., 2016. Methodology for Research I. *Indian Journal of Anaesthesia*, 60(9), pp.640-645. *https://doi.org/*10.4103/0019-5049.190619

Gear, C., Eppel, E. and Koziol-Mclain, J., 2018. Advancing Complexity Theory as a Qualitative Research Methodology. *International Journal of Qualitative Methods*, 17(1), pp.1-10. https://doi.org/10.1177/1609406918782557

Gibbs, G.R., Friese, S. and Mangabeira, W.C., 2002. The Use of New Technology in Qualitative Research. Introduction to Issue 3(2) of FQS [35 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 3(2). https://www.qualitative-research.net/index.php/fqs/article/view/847

Gill, P., Stewart, K., Treasure, E. and Chadwick, B., 2008. Methods of Data Collection in Qualitative Research: Interviews and Focus Groups. *British Dental Journal*, 204(6), pp.291-295. https://doi.org/10.1038/bdj.2008.192

Glass, G.V., 1976. Primary, Secondary, and Meta-Analysis of Research. *Educational Researcher*, 5(10), pp.3-8. https://doi.org/10.3102/0013189X005010003

Godsmark, C.N., Irlam, J., van der Merwe, F., New, M. and Rother, H.A., 2019. Priority Focus Areas for a Sub-National Response to Climate Change and Health: A South African Provincial Case Study. *Environment International*, 122, pp.31-51. https://doi.org/10.1016/j.envint.2018.11.035

Gondhalekar, D. and Ramsauer, T., 2017. Nexus City: Operationalizing the Urban Water-Energy-Food Nexus for Climate Change Adaptation in Munich, Germany. *Urban Climate*, 19, pp.28-40. https://doi.org/10.1016/j.uclim.2016.11.004

Gray, J., Whyte, I. and Curry, P., 2018. Ecocentrism: What it Means and What it Implies. *The Ecological Citizen*, 1(2), pp.130-131. https://doi.org/10.1016/j.uclim.2016.11.004

Grothmann, T., Grecksch, K., Winges, M. and Siebenhüner, B., 2013. Assessing Institutional Capacities to Adapt to Climate Change: Integrating Psychological Dimensions in the Adaptive Capacity Wheel. *Natural Hazards and Earth System Sciences*, 13(12), pp.3369-3384. https://doi.org/10.5194/nhess-13-3369-2013

Gupta, J., Termeer, C., Klostermann, J., Meijerink, S., Van den Brink, M., Jong, P., Nooteboom, S. and Bergsma, E., 2010. The Adaptive Capacity Wheel: a Method to Assess the Inherent Characteristics of Institutions to Enable the Adaptive Capacity of Society. *Environmental Science & Policy*, 13(6), pp.459-471. https://doi.org/10.1016/j.envsci.2010.05.006

Haggerty, K.D., 2004. Ethics Creep: Governing Social Science Research in the Name of Ethics. *Qualitative sociology*, 27, pp.391-414. https://doi.org/10.1023/B:QUAS.0000049239.15922.a3

Haider, H., 2019. Climate Change in Nigeria: Impacts and Responses. *K4D Helpdesk Report*, 675, pp.1-38. https://core.ac.uk/download/pdf/237087333.pdf. (Accessed 13/11/2022)

Halsnæs, K. and Verhagen, J., 2007. Development Based Climate Change Adaptation and Mitigation—Conceptual Issues and Lessons Learned in Studies in Developing Countries. *Mitigation and Adaptation Strategies for Global Change*, 12, pp.665-684. https://doi.org/10.1007/s11027-007-9093-6

Hay, R., 2010. The Relevance of Ecocentrism, Personal Development and Transformational Leadership to Sustainability and Identity. *Sustainable Development*, 18(3), pp.163-171. https://doi.org/10.1002/sd.456

Heyns, P., 2005. Water Institutional Reforms in Namibia. *Water policy*, 7(1), pp.89-106. https://doi.org/10.2166/wp.2005.0006

Hickmann, T. and Stehle, F., 2019. The Embeddedness of Urban Climate Politics in Multilevel Governance: A Case Study Of South Africa's Major Cities. *The Journal of Environment & Development*, 28(1), pp.54-77. https://doi.org/10.1177/1070496518819121

Hogarth, J.R. and Wójcik, D., 2016. An Evolutionary Approach to Adaptive Capacity Assessment: a Case Study of Soufriere, Saint Lucia. *Sustainability*, 8(3), Art 228, pp.1-23. https://doi.org/10.3390/su8030228

Hölscher, K., Frantzeskaki, N. and Loorbach, D., 2019. Steering Transformations Under Climate Change: Capacities for Transformative Climate Governance and the Case of Rotterdam, the Netherlands. *Regional Environmental Change*, 19, pp.791-805. https://doi.org/10.1007/s10113-018-1329-3

Hosen, N., Nakamura, H. and Hamzah, A., 2020. Adaptation to Climate Change: Does Traditional Ecological Knowledge Hold the Key? *Sustainability*, 12(2), Art 676. pp.1-18 https://doi.org/10.3390/su12020676

Huitema, D., Adger, W. N., Berkhout, F., Massey, E., Mazmanian, D., Munaretto, S., Plummer, R., Termeer, C. C. J. A. M., 2016. The Governance of Adaptation: Choices, Reasons, and Effects. Introduction to the Special Feature. *Ecology and Society*, 21(3), Art 37. pp.1-16 http://dx.doi.org/10.5751/ES-08797-210337

Humaida, N., 2020. The Importance of Ecocentrism to the Level of Environmental Awareness for Sustainable Natural Resources. In *IOP Conference Series: Earth and Environmental Science*, IOP Publishing. Bristol, UK. 399(1), Art 012131, pp.1-7 http://dx.doi.org/10.1088/1755-1315/399/1/012131

Huq, S., Reid, H. and Murray, L.A., 2006. Climate Change and Dev. Links. Gatekeeper Series 123. *Int. Insti. For Environ. Dev.* https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Huq%2C+S.%2C+Reid%2C+H.+and+Murray%2C+L.A.%2C+2006.+Climate+Change+and+Dev.+Links.+Gatekeeper+Series+123.+Int.+Insti.+For+Environ.+Dev.&btnG=. (Accessed 10/01/2023).

Huq, S., Reid, H., Konate, M., Rahman, A., Sokona, Y. and Crick, F., 2004. Mainstreaming Adaptation to Climate Change in Least Developed Countries (LDCs). *Climate Policy*, 4(1), pp.25-43. https://doi.org/10.1080/14693062.2004.9685508

Hurlbert, M. and Gupta, J., 2017. The Adaptive Capacity of Institutions in Canada, Argentina, and Chile to Droughts and Floods. *Regional Environmental Change*, 17(3), pp.865-877. https://doi.org/10.1007/s10113-016-1078-0

Husserl, E., 1962. Phänomenologische Psychologie. Husserliana IX. *Den Haag: Martinus Nijhoff*.https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Husserl%2C+E.%2C+1962.+Ph%C3%A4nomenologische+Psychologie.+Husserliana+IX.+Den+Haag%3A+Martinus+Nijhoff%2C+pp.1893-1917.&btnG=. (Accessed 22/01/2023)

Igwenagu, C., 2016. *Fundamentals of Research Methodology and Data Collection*. LAP Lambert Academic Publishing. Nigeria https://staging-nodebb-uploads.s3.amazonaws.com/FundamentalsofResearchMethodologyandDataCollection-%25philu%25-6fae26dd-631d-4e66-9864-663ec2b30204.pdf. (Accessed 17/06/2023)

Isaacs, A.N., 2014. An Overview of Qualitative Research Methodology for Public Health Researchers. *International Journal of Medicine and Public Health*, 4(4). pp.318-323. https://doi.org/10.4103/2230-8598.144055

Islam, M.T. and Nursey-Bray, M., 2017. Adaptation to Climate Change in Agriculture in Bangladesh: The Role of Formal Institutions. *Journal of Environmental Management*, 200, pp.347-358. https://doi.org/10.1016/j.jenvman.2017.05.092

Ivey, J.L., Smithers, J., De Loë, R.C. and Kreutzwiser, R.D., 2004. Community Capacity for Adaptation to Climate-Induced Water Shortages: Linking Institutional Complexity and Local Actors. *Environmental Management*, 33, p.36-47.https://doi.org/10.1007/s00267-003-0014-5

Jacobs, B., Nelson, R., Kuruppu, N. and Leith, P., 2015. An Adaptive Capacity Guide Book: Assessing, Building and Evaluating the Capacity of Communities to Adapt in a Changing Climate. *Hobart: Southern Slopes Climate Change Adaptation Research Partnership (SCARP)*, University of Technology Sydney and University of Tasmania. p.1-27. http://hdl.handle.net/10453/36221. (Accessed 19/07/2022).

Jamshed, S., 2014. Qualitative Research Method-Interviewing and Observation. *Journal of Basic and Clinical Pharmacy*, 5(4), p.87. https://doi.org/10.4103/0976-0105.141942

Jan, A., Khan, T.A. and Mahsud, M.I., 2020. The Climate Change Awareness and Literacy In Pakistan: Role of Media and Social Actors. *Liberal Arts and Social Sciences International Journal (LASSIJ)*, 4(2), pp.256-266. https://doi.org/10.47264/idea.lassij/4.2.20

Johnston, M.P., 2014. Secondary Data Analysis: A Method of Which the Time Has Come. *Qualitative and Quantitative Methods in Libraries*, 3(3), pp.619-626. https://qqml-journal.net/index.php/qqml/article/view/169/170. (Accessed 26/10/2022)

Jones, L., Ludi, E. and Levine, S., 2010. Towards A Characterisation of Adaptive Capacity: A Framework for Analysing Adaptive Capacity at the Local Level. *Overseas Development Institute*, London, UK. file:///C:/Users/Admin/Downloads/SSRN-id2782323.pdf. (Accessed 08/03/2023)]

Jones, L., Ludi, E., Jeans, H. and Barihaihi, M., 2019. Revisiting The Local Adaptive Capacity Framework: Learning from The Implementation of a Research and Programming Framework in Africa. *Climate And Development*, 11(1), pp.3-13. https://doi.org/10.1080/17565529.2017.1374237

Juhola, S. and Kruse, S., 2015. A Framework for Analysing Regional Adaptive Capacity Assessments: Challenges for Methodology and Policy Making. *Mitigation and Adaptation Strategies for Global Change*, 20, pp.99-120. https://doi.org/10.1007/s11027-013-9481-z

Juhola, S., Peltonen, L. and Niemi, P., 2012. The Ability of Nordic Countries to Adapt to Climate Change: Assessing Adaptive Capacity at the Regional Level. *Local Environment*, 17(6-7), pp.717-734. https://doi.org/10.1080/13549839.2012.665861

Jürkenbeck, K., Spiller, A. and Schulze, M., 2021. Climate Change Awareness of the Young Generation And its Impact on their Diet. *Cleaner and Responsible Consumption*, 3, Art 100041, pp.1-8 https://doi.org/10.1016/j.clrc.2021.100041

Kalbarczyk, E. and Kalbarczyk, R., 2022. Credibility Assessment of Municipal Climate Change Adaptation Plans Using the Ex-Ante Method: A Case Study of Poland. *Sustainable Cities and Society*, 87, Art 104242, pp.1-3 https://doi.org/10.1016/j.scs.2022.104242

Kashaigili, J.J., Rajabu, K. and Masolwa, P., 2009. Freshwater Management and Climate Change Adaptation: Experiences from the Great Ruaha River Catchment in Tanzania. *Climate and Development*, 1(3), pp.220-228. https://doi.org/10.3763/cdev.2009.0025

Kauffman, N. and Hill, K., 2021. Climate Change, Adaptation Planning and Institutional Integration: A Literature Review and Framework. *Sustainability*, 13(19), Art 10708, pp.1-28 https://doi.org/10.3390/su131910708

Kielmann, K., Cataldo, F. and Seeley, J. 2012. Introduction to Qualitative Research Methodology: a Training Manual. Bangalore, India. https://collaboration.worldbank.org/content/usergenerated/asi/cloud/attachments/sites/collaboration-for-development/en/groups/results-based-financing/documents/jcr:content/content/primary/blog/how_important_isthe-I7qE/Introduction%20to%20Qualitative%20Research%20Methodology%20-%20A%20Training%20Manual.pdf. (Accessed 20/10/2022).

Kiger, M.E. and Varpio, L., 2020. Thematic Analysis of Qualitative Data: AMEE Guide No. 131. *Medical teacher*, 42(8), pp.846-854. https://doi.org/10.1080/0142159X.2020.1755030

Koch, I. C., Vogel, C., Patel, Z., 2007. Institutional Dynamics and Climate Change Adaptation in South Africa. Mitigation and Adaptation Strategies for Global Change, 12(8), pp 1323-1339. https://doi.org/10.1007/s11027-006-9054-5

Kolström, M., Lindner, M., Vilén, T., Maroschek, M., Seidl, R., Lexer, M.J., Netherer, S., Kremer, A., Delzon, S., Barbati, A. and Marchetti, M., 2011. Reviewing The Science and Implementation of Climate Change Adaptation Measures in European Forestry. *Forests*, 2(4), pp.961-982. https://doi.org/10.3390/f2040961

Kom, Z., Nethengwe, N.S., Mpandeli, N.S. and Chikoore, H., 2022. Determinants Of Small-Scale Farmers' Choice and Adaptive Strategies in Response to Climatic Shocks in Vhembe District, South Africa. *GeoJournal*, 87(2), pp.677-700. https://doi.org/10.1007/s10708-020-10272-7

Koop, S.H.A., Koetsier, L., Doornhof, A., Reinstra, O., Van Leeuwen, C.J., Brouwer, S., Dieperink, C. and Driessen, P.P.J., 2017. Assessing the Governance Capacity of Cities to Address Challenges of Water, Waste, And Climate Change. *Water resources management*, 31, pp.3427-3443. https://doi.org/10.1007/s11269-017-1677-7

Kopnina, H., 2019. Ecocentric Education: Student Reflections on Anthropocentrism–Ecocentrism Continuum and Justice. *Journal of Education for Sustainable Development*, 13(1), pp.5-23. https://doi.org/10.1177/0973408219840567

Kopnina, H., Washington, H., Gray, J. and Taylor, B., 2018. The 'Future Of Conservation' debate: Defending Ecocentrism And The Nature Needs Half Movement. *Biological Conservation*, 217, pp.140-148. https://doi.org/10.1016/j.biocon.2017.10.016

Kortenkamp, K.V. and Moore, C.F., 2001. Ecocentrism and Anthropocentrism: Moral Reasoning about Ecological Commons Dilemmas. *Journal of Environmental Psychology*, 21(3), pp.261-272. https://doi.org/10.1006/jevp.2001.0205

Kuhlmann, S. and Wollmann, H., 2011. The Evaluation of Institutional Reforms at Sub-National Government Levels: A Still Neglected Research Agenda. *Local Government Studies*, 37(5), pp.479-494. https://doi.org/10.1080/03003930.2011.604542

Landauer, M., Juhola, S. and Klein, J., 2019. The Role of Scale in Integrating Climate Change Adaptation and Mitigation in Cities. *Journal of Environmental Planning and Management*, 62(5), pp.741-765. https://doi.org/10.1080/09640568.2018.1430022

Lawrence, T. B., 2008. Power, Institutions and Organizations. In Greenwood, R., Oliver, C., Suddaby, R., and Sahlin K. (Eds.). *The Sage Handbook of Organizational Institutionalism*. pp.170 –197. Sage, London, UK.

Leal Filho, W., Balogun, A.L., Ayal, D.Y., Bethurem, E.M., Murambadoro, M., Mambo, J., Taddese, H., Tefera, G.W., Nagy, G.J., Fudjumdjum, H. and Mugabe, P., 2018. Strengthening Climate Change Adaptation Capacity in Africa-Case Studies from Six Major African Cities and Policy Implications. *Environmental Science & Policy*, 86, pp.29-37. https://doi.org/10.1016/j.envsci.2018.05.004

Leck, H. and Roberts, D., 2015. What Lies Beneath: Understanding The Invisible Aspects of Municipal Climate Change Governance. *Current Opinion in Environmental Sustainability*, 13, pp.61-67. https://doi.org/10.1016/j.cosust.2015.02.004

Leck, H. and Simon, D., 2018. Local Authority Responses to Climate Change in South Africa: The Challenges of Transboundary Governance. *Sustainability*, 10(7), Art 2542, pp.1-18 https://doi.org/10.3390/su10072542

Lenhardt, A., 2020. The Costs of Climate Change Adaptation in Middle-Income Countries. *K4D Helpdesk Report 876*. Institute of Development Studies, Brighton, UK. https://core.ac.uk/download/pdf/334428457.pdf. (Accessed 20/04/2023)

Lim, B., Spanger-Siegfried, E., Burton, I., Malone, E. and Huq, S., 2005. Adaptation Policy Frameworks for Climate Change: Developing Strategies, Policies, and Measures. *Cambridge*

University Press, Cambridge, UK. https://www.tellus.org/pub/Adaptation_Policy_Framework.pdf. (Accessed 23/04/2023)

Maldonado-Méndez, M.D.L., Romo-Lozano, J.L. and Monterroso-Rivas, A.I., 2022. Determinant Indicators for Assessing the Adaptive Capacity of Agricultural Producers to Climate Change. *Atmosphere*, 13(7), Art 1114, pp.1-15. https://doi.org/10.3390/atmos13071114

Marcia, N.L. and Simwela, A., 2019. Ecocentrism for the Sustainable Conservation And Management Of Elephants in Southern Africa. *Int. J. Sci. Res. Publ*, 9(5), pp.614-621. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Marcia%2C+N.L.+and+Simwela%2C+A.%2C+2019.+Ecocentrism+for+the+sustainable+conservation+and+management+of+elephants+in+southern+Africa.+Int.+J.+Sci.+Res.+Publ%2C+9%285%29%2C+pp.614-621.&btnG=. (Accessed 3/12/2022)

Massey, E. and Huitema, D., 2013. The Emergence of Climate Change Adaptation as a Policy Field: The Case of England. *Regional Environmental Change*, *13*, pp.341-352. https://doi.org/10.1007/s10113-012-0341-2

Massey, E. and Huitema, D., 2013. The Emergence of Climate Change Adaptation as a Policy Field: The Case of England. *Regional Environmental Change*, 13, pp.341-352. https://doi.org/10.1007/s10113-012-0341-2

Mcsweeney, C., New, M., Lizcano, G. and Lu, X., 2010. The UNDP Climate Change Country Profiles: Improving the Accessibility Of Observed And Projected Climate Information For Studies of Climate Change in Developing Countries. *Bulletin of the American Meteorological society*, 91(2), pp.157-166. http://www.jstor.org/stable/26232858. (Accessed 16/05/2023)

Measham, T.G., Preston, B.L., Smith, T.F., Brooke, C., Gorddard, R., Withycombe, G. and Morrison, C., 2011. Adapting To Climate Change Through Local Municipal Planning: Barriers and Challenges. *Mitigation and Adaptation Strategies for Global Change*, 16, pp.889-909. https://doi.org/10.1007/s11027-011-9301-2

Mees, H., 2017. Local Governments in the Driving Seat? A Comparative Analysis of Public and Private Responsibilities for Adaptation to Climate Change in European and North American Cities. *Journal of Environmental Policy & Planning*, 19(4), pp.374-390. https://doi.org/10.1080/1523908X.2016.1223540

Mees, H.L., Uittenbroek, C.J., Hegger, D.L. and Driessen, P.P., 2019. From Citizen Participation to Government Participation: An Exploration of the Roles of Local Governments in Community Initiatives for Climate Change Adaptation in the Netherlands. *Environmental Policy and Governance*, 29(3), pp.198-208. https://doi.org/10.1002/eet.1847

Meijerink, S. and Stiller, S., 2013. What Kind of Leadership do We Need for Climate Adaptation? A Framework for Analysing Leadership Objectives, Functions, And Tasks in Climate Change Adaptation. *Environment and Planning C: Government and Policy*, 31(2), pp.240-256. https://doi.org/10.1068/c11129

Metcalfe, J.S., 2001. Institutions and Progress. *Industrial and Corporate Change*, 10(3), pp.561-586. https://doi.org/10.1068/c11129

Mikulewicz, M., 2018. Politicizing Vulnerability and Adaptation: On the Need to Democratize Local Responses to Climate Impacts in Developing Countries. *Climate and Development*, 10(1), pp.18-34. https://doi.org/10.1080/17565529.2017.1304887

Millington, N. and Scheba, S., 2021. Day Zero and The Infrastructures of Climate Change: Water Governance, Inequality, and Infrastructural Politics in Cape Town's Water Crisis. *International Journal of Urban and Regional Research*, 45(1), pp.116-132. https://doi.org/10.1111/1468-2427.12899

Mishra, S.B. and Alok, S., 2022. Handbook of research methodology. Educreation Publishing, Chhattisgarh, India. part 2. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Mishra%2C+S.B.+and+Alok%2C+S.%2C+2022.+Handbook+of+research+methodology.&btnG=. (Accessed 19/9/2023)

Mohajan, H.K., 2018. Qualitative Research Methodology in Social Sciences and Related Subjects. *Journal of Economic Development, Environment, and People*, 7(1), pp.23-48. https://mpra.ub.uni-muenchen.de/85654/1/mpra_paper_85654.pdf. (Accessed 16/7/2022)

Monstadt, J., 2007. Urban Governance and The Transition of Energy Systems: Institutional Change and Shifting Energy and Climate Policies in Berlin. *International Journal of Urban and Regional Research*, 31(2), pp.326-343. https://doi.org/10.1111/j.1468-2427.2007.00725.x

Montmasson-Clair, G. and Zwane, M., 2016. Climate Change Adaptation and Agriculture In South Africa: A Policy Assessment. *Report compiled for WWF-SA. South Africa*. pp 1-24. https://www.greenagri.org.za/assets/documents-/Projects-Research/WWF/WWF-PFU-Policy-brief-lowres.pdf. (Accessed 24/1/2023)

Morecroft, M.D., Duffield, S., Harley, M., Pearce-Higgins, J.W., Stevens, N., Watts, O. and Whitaker, J., 2019. Measuring The Success of Climate Change Adaptation and Mitigation in Terrestrial Ecosystems. *Science*, 366(6471), pp.1327-1328 https://doi.org/10.1126/science.aaw9256

Moser, C., Norton, A., Stein, A. and Georgieva, S., 2010. Pro-Poor Adaptation to Climate Change in Urban Centres: Case Studies of Vulnerability and Resilience in Kenya and Nicaragua, Report No. 54947-GLB, Washington, World Bank, Social Development Department, available at http://siteresources.worldbank.org/EXTSOCIALDEVELOPMENT/Resources/244362-71232059926563/5747581123913198552 8/ESW_propoorurbanadaptationReport4947GLBweb2.pdf. (Accessed 22/02/2023)

Moser, C.O. and Satterthwaite, D., 2009. Towards Pro-Poor Adaptation to Climate Change in the Urban Centres of Low-and Middle-Income Countries. In Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World, Edited by: Mearns, R and Norton, A. pp 231-258. Washington, DC: World Bank.

Moser, S.C. and Ekstrom, J.A., 2010. A Framework to Diagnose Barriers to Climate Change Adaptation. *Proceedings of the National Academy of Sciences*, 107(51), pp.22026-22031. https://doi.org/10.1073/pnas.1007887107

Mpandeli, S., Nhamo, L., Moeletsi, M., Masupha, T., Magidi, J., Tshikolomo, K., Liphadzi, S., Naidoo, D. and Mabhaudhi, T., 2019. Assessing Climate Change and Adaptive Capacity at Local Scale Using Observed and Remotely Sensed Data. *Weather and Climate Extremes*, 26, Art 100240, pp 1-13. https://doi.org/10.1073/pnas.1007887107

Muller, C. and Shackleton, S.E., 2014. Perceptions Of Climate Change and Barriers to Adaptation Amongst Commonage and Commercial Livestock Farmers in the Semi-Arid Eastern Cape Karoo. *African Journal of Range & Forage Science*, 31(1), pp.1-12. https://doi.org/10.2989/10220119.2013.845606

Mutizwa, B., 2023. Climate Change and Human Security in Zimbabwe. *Journal of Humanities and Social Sciences (JHASS)*, 5(2), pp.53-64. https://doi.org/10.36079/lamintang.jhass-0502.543

Mweshi, G.K., 2020. Determining the Application of a Qualitative Research for the Study. *Engineering and Science*, 5(2), pp.33-37. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Mweshi%2C+G.K.%2C+2020.+Determining+the+Application+of+a+Qualitative+Research+for+the+Study.+Engineering+and+Science%2C+5%282%29%2C+pp.33-37.&btnG=. (Accessed 12/12/2022)

Nagoda, S. and Nightingale, A.J., 2017. Participation And Power in Climate Change Adaptation Policies: Vulnerability in Food Security Programs in Nepal. *World Development*, 100, pp.85-93. https://doi.org/10.1016/j.worlddev.2017.07.022

Nayak, J.K. and Singh, P., 2021. Fundamentals of Research Methodology Problems and Prospects. *SSDN Publishers & Distributors*. New Delhi, India. http://dspace.vnbrims.org:13000/jspui/bitstream/123456789/4653/1/Fundamentals%20of%20Research%20Methodology_Nayak.pdf. (Accessed 16/10/2022)

Ndebele-Murisa, M.R., Mubaya, C.P., Pretorius, L., Mamombe, R., Iipinge, K., Nchito, W., Mfune, J.K., Siame, G. and Mwalukanga, B., 2020. City to City Learning and Knowledge

Exchange for Climate Resilience in Southern Africa. *PloS one*, 15(1), pp.1-25. https://doi.org/10.1371/journal.pone.0227915

Nekhamkin, V., Chernogortseva, G. and Kishkin, N., 2018. Ecocentrism and its Alternatives Within the Worldview Paradigm. In International Conference on Contemporary Education, Social Sciences and Ecological Studies (CESSES 2018). *Atlantis Press*. pp. 865-868. https://doi.org/10.2991/cesses-18.2018.191

Nhamo, G. and Agyepong, A.O., 2019. Climate Change Adaptation and Local Government: Institutional Complexities Surrounding Cape Town's Day Zero. *Jàmbá: Journal of Disaster Risk Studies*, 11(3), pp.1-9. https://journals.co.za/doi/abs/10.4102/jamba.v11i3.717

Nightingale, A.J., 2017. Power and Politics in Climate Change Adaptation Efforts: Struggles Over Authority and Recognition in the Context of Political Instability. *Geoforum*, 84, pp.11-20. https://doi.org/10.1016/j.geoforum.2017.05.011

Nkhonjera, G.K., 2017. Understanding The Impact of Climate Change on the Dwindling Water Resources of South Africa, Focusing Mainly on Olifants River Basin: A Review. *Environmental Science & Policy*, 71, pp.19-29. https://doi.org/10.1016/j.envsci.2017.02.004

Oduniyi, O.S., Antwi, M.A. and Tekana, S.S., 2019. Determinants of Adaptation Measures on Climate Change. A Case of Small-Scale Maize Farmers in the North-West Province of South Africa. *Applied Ecology and Environmental Research*, 17(5), pp.11261-11272. https://doi.org/10.15666/aeer/1705_1126111272

Ofoegbu, C., Chirwa, P.W., Francis, J. and Babalola, F.D., 2016. Assessing Forest-Based Rural Communities' Adaptive Capacity and Coping Strategies For Climate Variability And Change: The Case Of Vhembe District in South Africa. *Environmental Development*, 18, pp.36-51. https://doi.org/10.1016/j.envdev.2016.03.001

Ogden, A.E. and Innes, J.L., 2008. Climate Change Adaptation and Regional Forest Planning In Southern Yukon, Canada. *Mitigation and Adaptation Strategies for Global Change*, 13, pp.833-861. https://doi.org/10.1007/s11027-008-9144-7

Ojo, T.O., Adetoro, A.A., Ogundeji, A.A. and Belle, J.A., 2021. Quantifying the Determinants of Climate Change Adaptation Strategies and Farmers' Access to Credit in South Africa. *Science of the Total Environment*, 792, Art 148499, pp.1-34. https://doi.org/10.1016/j.scitotenv.2021.148499

Olazabal, M., Galarraga, I., Ford, J., Sainz De Murieta, E. and Lesnikowski, A., 2019. Are Local Climate Adaptation Policies Credible? A Conceptual and Operational Assessment Framework. *International Journal of Urban Sustainable Development*, 11(3), pp.277-296. https://doi.org/10.1080/19463138.2019.1583234

Oreskes, N., 2004. The scientific consensus on climate change. *Science*, 306(5702), pp.1686-1686. https://doi.org/10.1080/19463138.2019.1583234

Ørngreen, R. and Levinsen, K.T., 2017. Workshops as a Research Methodology. *Electronic Journal of E-learning*, 15(1), pp.70-81. https://vbn.aau.dk/en/publications/workshops-as-a-research-methodology. (Accessed 10/12/2022)

Pardoe, J., Conway, D., Namaganda, E., Vincent, K., Dougill, A.J. and Kashaigili, J.J., 2018. Climate Change and the Water–Energy–Food Nexus: Insights from Policy and Practice in Tanzania. *Climate Policy*, 18(7), pp.863-877. https://doi.org/10.1080/14693062.2017.1386082

Pasquini, L. and Shearing, C., 2014. Municipalities, Politics, And Climate Change: An Example of The Process Of Institutionalizing an Environmental Agenda Within Local Government. *The Journal of Environment & Development*, 23(2), pp.271-296. https://doi.org/10.1177/1070496514525406

Pasquini, L., Cowling, R.M. and Ziervogel, G., 2013. Facing the Heat: Barriers to Mainstreaming Climate Change Adaptation in Local Government in the Western Cape

Province, South Africa. *Habitat International*, 40, pp.225-232. https://doi.org/10.1016/j.habitatint.2013.05.003

Pasquini, L., Ziervogel, G., Cowling, R.M. and Shearing, C., 2015. What Enables Local Governments to Mainstream Climate Change Adaptation? Lessons Learned from Two Municipal Case Studies in the Western Cape, South Africa. *Climate and Development*, 7(1), pp.60-70. https://doi.org/10.1080/17565529.2014.886994

Patterson, J.J. and Huitema, D., 2019. Institutional Innovation in Urban Governance: The Case of Climate Change Adaptation. *Journal of Environmental Planning and Management*, 62(3), pp.374-398. https://doi.org/10.1080/09640568.2018.1510767

Phillips, N., Lawrence, T.B. and Hardy, C., 2004. Discourse and Institutions. *Academy of Management Review*, 29(4), pp.635-652. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Discourse+and+institutions.+Academy+of+management+review%2C+29%284%29%2C+pp.635-652.+&btnG=. (Accessed 19/03/2023)

Phulkerd, S., Vandevijvere, S., Lawrence, M., Tangcharoensathien, V., Sacks, G., 2017. Level Of Implementation of Best Practice Policies for Creating Healthy Food Environments: Assessment by State And Non-State Actors in Thailand. *Public Health Nutrition*, 20(3), pp.381– 390. https://doi.org/10.1017/S1368980016002391

Piccolo, J., Durtsche, R., Watz, J., Österling, M. and Calles, O., 2019. Future Rivers, Dams and Ecocentrism. *The Ecological Citizen*, 2(2), pp.173-177. https://www.ecologicalcitizen.net/pdfs/v02n2-12.pdf. (Accessed 13/9/2022)

Pires, P., Ribas Junior, R.D.C., Lemos, D.C.L. and Filgueiras, A., 2014. Ecocentrism and Behavior: A Bibliographic Review on Environmental Values. *Psicologia Em Estudo*, 19, pp.611-620. https://doi.org/10.1590/1413-73722201204

Popoola, O.O., Yusuf, S.F.G. and Monde, N., 2020. Information Sources and Constraints To Climate Change Adaptation Amongst Smallholder Farmers in Amathole District Municipality,

Eastern Cape Province, South Africa. *Sustainability*, 12(14), Art 5846, pp.1-23 https://doi.org/10.3390/su12145846

Poth, C.N., 2019. Rigorous and Ethical Qualitative Data Reuse: Potential Perils and Promising Practices. *International Journal of Qualitative Methods*, 18, pp.1-4. https://doi.org/10.1177/1609406919868870

Province of Eastern Cape Cooperative Governance & Traditional Affairs: IDP Analysis and Assessment Framework 2021/22. https://www.cogta.gov.za/cgta_2016/wp-content/uploads/2021/02/AMATHOLOLE-DISTRICT-2020-2021.pdf. (04/05/2023)

Purser, R.E. and Montuori, A., 1996. Ecocentrism is in the Eye of the Beholder. *Academy of Management Review*, 21(3), pp.611-613. https://www.jstor.org/stable/258993 (Accessed 17/7/2022)

Quay, R., 2010. Anticipatory Governance: A Tool for Climate Change Adaptation. *Journal of the American Planning Association*, 76(4), pp.496-511. https://doi.org/10.1080/01944363.2010.508428

Raj, K.S., Ecocentrism vs Anthropocentrism: A Critical Study. E*ncounter*, 9(1), pp.111-113. https://www.researchgate.net/profile/A-Ospanova3/publication/360039326_JOURNAL_OF_CRITICAL_REVIEWS_Ecocentrism_vs_Anthropocentrism_A_Critical_Study/links/625eb2861c096a380d10c01f/JOURNAL-OF-CRITICAL-REVIEWS-Ecocentrism-vs-Anthropocentrism-A-Critical-Study.pdf. (Accessed 12/9/2023)

Regmi, B.R. and Bhandari, D., 2013. Climate Change Adaptation in Nepal: Exploring Ways to Overcome the Barriers. *Journal of Forest and Livelihood*, 11(1), pp.43-61. https://www.researchgate.net/profile/Bimal-Regmi/publication/275904851_Climate_Change_Adaptation_in_Nepal_Exploring_Ways_to_Overcome_the_Barriers/links/623c2ab03818892e0a6cdce3/Climate-Change-Adaptation-in-Nepal-Exploring-Ways-to-Overcome-the-Barriers.pdf?_sg%5B0%5D=started_experiment_milestone&origin=journalDetail&_rtd=e30%3D. (Accessed 22/6/2023)

Roberts, D., 2010. Prioritizing Climate Change Adaptation and Local Level Resilience in Durban, South Africa. *Environment and Urbanization*, 22(2), pp.397-413. https://doi.org/10.1177/0956247810379948

Roberts, D., Douwes, J., Sutherland, C. and Sim, V., 2020. Durban's 100 Resilient Cities Journey: Governing Resilience from Within. *Environment and Urbanization*, *32*(2), pp.547-568. https://doi.org/10.1177/0956247820946555

Rodrik, D. and Subramanian, A., 2003. The Primacy of Institutions. *Finance and development*, 40(2), pp.31-34. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=7be32b1d599c786b06ec0a516b5a56686244f6df. (Accessed 21/6/2023)

Rosendo, S., Celliers, L. and Mechisso, M., 2018. Doing More with the Same: A Reality-Check on the Ability of Local Government to Implement Integrated Coastal Management for Climate Change Adaptation. *MarinePolicy*, 87, pp.29-39.https://doi.org/10.1016/j.marpol.2017.10.001

Ross, P.T. and Bibler Zaidi, N.L., 2019. Limited by our Limitations. *Perspectives on Medical Education*, 8, pp.261-264. https://doi.org/10.1007/s40037-019-00530-x

Ruggiano, N. and Perry, T.E., 2019. Conducting Secondary Analysis of Qualitative Data: Should We, Can We, And How? *Qualitative Social Work*, 18(1), pp.81-97. https://doi.org/10.1177/1473325017700701

Rülke, J., Rieckmann, M., Nzau, J.M. and Teucher, M., 2020. How Ecocentrism And Anthropocentrism Influence Human–Environment Relationships in a Kenyan Biodiversity Hotspot. *Sustainability*, 12(19), Art 8213, pp.1-23. https://doi.org/10.3390/su12198213

Salamon, L.M., 2000. The New Governance and The Tools Of Public Action: An Introduction. *Fordham Urb. LJ*, 28, pp.1611-1674. https://ir.lawnet.fordham.edu/ulj/vol28/iss5/4. (Accessed 25/04/2023).

Saleth, R.M. and Dinar, A., 2005. Water Institutional Reforms: Theory and Practice. *Water Policy*, 7(1), pp.1-19. https://doi.org/10.2166/wp.2005.0001

Samuels, M.I., Masubelele, M.L., Cupido, C.F., Swarts, M.B.V., Foster, J., De Wet, G., Links, A., Van Orsdol, K. and Lynes, L.S., 2022. Climate Vulnerability and Risks to an Indigenous Community in the Arid Zone of South Africa. *Journal of Arid Environments*, 199, Art 104718, pp.1-11. https://doi.org/10.1016/j.jaridenv.2022.104718

Santhia, D., Shackleton, S. and Pereira, T., 2018. Mainstreaming Sustainable Adaptation to Climate Change into Municipal Planning: An Analysis from The Eastern Cape, South Africa. *Development Southern Africa*, 35(4), pp.589-608. https://doi.org/10.1080/0376835X.2018.1488583

Sibiya, N., Sithole, M., Mudau, L. and Simatele, M.D., 2022. Empowering the Voiceless: Securing the Participation of Marginalised Groups in Climate Change Governance in South Africa. *Sustainability*, 14(12), Art 7111, pp.1-20. https://doi.org/10.3390/su14127111

Siders, A.R., 2019. Adaptive capacity to climate change: A Synthesis Of Concepts, Methods, and Findings in a Fragmented Field. *Wiley Interdisciplinary Reviews: Climate Change*, 10(3), pp.1-34. https://doi.org/10.1002/wcc.573

Sietchiping, R., 2006. Applying an Index of Adaptive Capacity to Climate Change in Northwestern Victoria, Australia. *Applied GIS*, Vol. 2(3), pp 16.1–16.28. https://www.researchgate.net/profile/Remy-Sietchiping/publication/228401592_Applying_an_index_of_adaptive_capacity_to_climate_change_in_north-western_Victoria_Australia/links/6177ebe6a767a03c14b5f218/Applying-an-index-of-adaptive-capacity-to-climate-change-in-north-western-Victoria-Australia.pdf?origin=journalDetail&_tp=eyJwYWdlIjoiam91cm5hbERldGFpbCJ9. (Access 21/8/2023)

Simatele, D. and Simatele, M., 2015. Migration as an Adaptive Strategy to Climate Variability: A Study of the Tonga-Speaking People of Southern Zambia. *Disasters*, 39(4), pp.762-781. https://doi.org/10.1111/disa.12124

Simatele, D.M., 2010. Climate Change Adaptation in Lusaka, Zambia: A Case Study of Kalingalinga and Linda Compounds. *Global Urban Research Centre*, University of Manchester, UK https://hummedia.manchester.ac.uk/schools/seed/gurc/working_papers/GURC_wp6_web.pdf. (Accessed 26/1/2023)

Simon, M.K. and Goes, J., 2013. Assumptions, Limitations, Delimitations, and Scope of the Study (Doctoral Dissertation, Dissertation, And Scholarly Research: Recipes for Success). *Seattle, WA* (Doctoral Dissertation, Dissertation Success, LLC). https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Simon%2C+M.K.+and+Goes%2C+J.%2C+2013.+Assumptions%2C+limitations%2C+delimitations%2C+and+scope+of+the+study+%28Doctoral+dissertation%2C+Dissertation%2C+and+scholarly+research%3A+Recipes+for+success%29.+Seattle%2C+WA+%28Doctoral+dissertation%2C+Dissertation+Success%2C+LLC%29.&btnG=. (Accessed 19/06/22)

Simpson, N.P., Mach, K.J., Constable, A., Hess, J., Hogarth, R., Howden, M., Lawrence, J., Lempert, R.J., Muccione, V., Mackey, B. and New, M.G., 2021. A Framework for Complex Climate Change Risk Assessment. *One Earth*, 4(4), pp.489-501. https://doi.org/10.1016/j.oneear.2021.03.005

Singh, A.S., Zwickle, A., Bruskotter, J.T. and Wilson, R., 2017. The Perceived Psychological Distance of Climate Change Impacts and its Influence on Support for Adaptation Policy. *Environmental Science & Policy*, 73, pp.93-99. https://doi.org/10.1016/j.envsci.2017.04.011

Singh, C., Iyer, S., New, M.G., Few, R., Kuchimanchi, B., Segnon, A.C. and Morchain, D., 2022. Interrogating 'Effectiveness' in Climate Change Adaptation: 11 Guiding Principles for Adaptation Research and Practice. *Climate and Development*, 14(7), pp.650-664. https://doi.org/10.1080/17565529.2021.1964937

Smit, B., and Skinner, M.W., 2002. Adaptation Options in Agriculture to Climate Change: A Typology. *Mitigation And Adaptation Strategies for Global Change*, 7(1), pp.85-114. https://doi.org/10.1023/A:1015862228270

Smythe, W.E. and Murray, M.J., 2000. Owning the Story: Ethicalg Considerations in Narrative Research. *Ethics & Behavior*, 10(4), pp.311-336. https://doi.org/10.1207/S15327019EB1004_1

Sokona, Y., Uku, J., Zablone, O., Diop, S.H., Kunamwene, I., Lesolang, P., McNamara, A., Muhwanga, J., Said, M., Alare, R.S. and Simalabwi, A., 2021. Accelerating Adaptation Action in Africa. CDKN Working Paper. https://cdkn.org/sites/default/files/files/WP-Accelerated-Adaptation-WEB.pdf. (Accessed 15/9/2023)

Sovacool, B.K., D'Agostino, A.L., Rawlani, A. and Meenawat, H., 2012. Improving Climate Change Adaptation in Least Developed Asia. *Environmental Science & Policy*, 21, pp.112-125. https://doi.org/10.1016/j.envsci.2012.04.009

St. Clair, S.B. and Lynch, J.P., 2010. The Opening of Pandora's Box: Climate Change Impacts on Soil Fertility and Crop Nutrition in Developing Countries. *Plant and Soil*, 335, pp.101-115. https://doi.org/10.1016/j.envsci.2012.04.009

Speziale, H.S., Streubert, H.J. and Carpenter, D.R., 2011. Qualitative Research in Nursing: Advancing the Humanistic Imperative. *Lippincott Williams & Wilkins*. Philadelphia, PA, USA. https://books.google.co.za/books?hl=en&lr=&id=xNByh3B1Wt0C&oi=fnd&pg=PA202&dq=Speziale,+H.S.,+Streubert,+H.J.+and+Carpenter,+D.R.,+2011.+Qualitative+Research+in+Nursing:+Advancing+the+Humanistic+Imperative.+Lippincott+Williams+%26+Wilkins.+Philadelphia,+PA,+USA.+&ots=UwI82MgVJz&sig=srIkLNH43l3fTT_WpBlcpW-jN6M&redir_esc=y#v=onepage&q&f=false. (Accessed 13/09/2022)

Stringer, L. C., Dyer, J. C., Reed, M. S., Dougill, A. J., Twyman, C., Mkwambisi, D., 2009. Adaptations to Climate Change, Drought, And Desertification: Local Insights to Enhance Policy In Southern Africa. *Environmental Science & Policy*, Vol. 12 (7), pp 748-765. https://doi.org/10.1016/j.envsci.2009.04.002

Subiyanto, A., Boer, R., Aldrian, E., & Kinseng, R. (2020). Climate Resilience: Concepts, Theory and Methods of Measuring. *Environment Asia*, 13, pp.1-13. http://dx.doi.org/10.14456/ea.2020.1

Sutrisna, M., 2009, May. Research Methodology In Doctoral Research: Understanding The Meaning of Conducting Qualitative Research. In Proceedings of the Association of Researchers in Construction Management (ARCOM) Doctoral Workshop held in Liverpool John Moores University. pp. 48-57. *ARCOM*, Liverpool, UK https://www.researchgate.net/profile/Monty-Sutrisna/publication/275956584_Research_Methodology_in_Doctoral_Research_Understanding_the_Meaning_of_Conducting_Qualitative_Research/links/554b40990cf21ed2135914a5/Research-Methodology-in-Doctoral-Research-Understanding-the-Meaning-of-Conducting-Qualitative-Research.pdf. (Accessed 28/03/2022)

Swalheim, S. and Dodman, D., 2008. Building Resilience: How the Urban Poor can Drive Climate Adaptation. *Institute for Environment and Development (IIED)*, Sustainable Development Opinion. London. United Kingdom, pp. 1-2. https://www.osti.gov/etdeweb/servlets/purl/22059803. (Accessed 4/7/2023)

Szabo, V. and Strang, V.R., 1997. Secondary Analysis of Qualitative Data. *Advances In Nursing Science*, 20(2), pp.66-74. https://journals.lww.com/advancesinnursingscience/abstract/1997/12000/secondary_analysis_of_qualitative_data.8.aspx. (Accessed 30/5/2022)

Tate, J.A. and Happ, M.B., 2018. Qualitative Secondary Analysis: A Case Exemplar. *Journal of Pediatric Health Care*, 32(3), pp.308-312. https://doi.org/10.1016/j.pedhc.2017.09.007

Taylor, B., Chapron, G., Kopnina, H., Orlikowska, E., Gray, J. and Piccolo, J.J., 2020. The Need for Ecocentrism in Biodiversity Conservation. *Conservation Biology*, *34*(5), pp.1089-1096. https://doi.org/10.1111/cobi.13541

Theofanidis, D. and Fountouki, A., 2018. Limitations And Delimitations in the Research Process. *Perioperative Nursing-Quarterly Scientific, Online Official Journal of GORNA*, 7, pp.155-163. https://doi.org/10.5281/zenodo.2552022

Thi Hong Phuong, L., Biesbroek, G.R. and Wals, A.E., 2017. The Interplay Between Social Learning and Adaptive Capacity in Climate Change Adaptation: A Systematic Review. *NJAS: Wageningen Journal of Life Sciences*, 82(1), pp.1-9. https://doi.org/10.1016/j.njas.2017.05.001

Thomas, K., Hardy, R.D., Lazrus, H., Mendez, M., Orlove, B., Rivera-Collazo, I., Roberts, J.T., Rockman, M., Warner, B.P. and Winthrop, R., 2019. Explaining Differential Vulnerability to Climate Change: A Social Science Review. *Wiley Interdisciplinary Reviews: Climate Change*, *10*(2), pp.1-18. https://doi.org/10.1002/wcc.565

Thoring, K., Mueller, R. M. and Badke-Schaub, P., 2020. Workshops as a Research Method: Guidelines for Designing and Evaluating Artifacts Through Workshops. Proceedings of the 53rd Hawaii International Conference on System Sciences (HICSS2020). pp. 5036-5045. http://hdl.handle.net/10125/64362. (Accessed 26/07/2023).

Tompkins, E.L. and Adger, W.N., 2004. Does Adaptive Management of Natural Resources Enhance Resilience to Climate Change? *Ecology and society*, 9(2). Art 10, pp.1-14. https://www.jstor.org/stable/26267677. (Accessed 1/5/2023)

Tongco, M.D.C., 2007. Purposive Sampling as a Tool for Informant Selection. *Ethnobotany Research & Applications*, 5, pp.147-158. http://hdl.handle.net/10125/227. (Accessed 24/04/2022)

Torjman, S., 2005. What is Policy? *Ottawa, Ont,: Caledon Institute of Social Policy*. pp. 1-53 http://www.caledoninst.org/. (Accessed 12/03/2022)

Tschakert, P. and Dietrich, K.A., 2010. Anticipatory Learning for Climate Change Adaptation and Resilience. *Ecology and society*, 15(2). Art 11, pp.1-23. https://www.jstor.org/stable/26268129. (Accessed 16/5/2023).

Tuffour, I., 2017. A Critical Overview of Interpretative Phenomenological Analysis: A Contemporary Qualitative Research Approach. *Journal Of Healthcare Communications*, 2(4), Art 52, pp.1-5 https://doi.org/10.4172/2472-1654.100093

van den Brink, M., Meijerink, S., Termeer, C. and Gupta, J., 2014. Climate-Proof Planning for Flood-Prone Areas: Assessing the Adaptive Capacity of Planning Institutions in the Netherlands. *Regional Environmental Change*, 14, pp.981-995. https://doi.org/10.4172/2472-1654.100093

VanScoy, A., Bossaller, J. and Burns, C.S., 2018. Problems and Promises of Qualitative Secondary Analysis for Research in Information Science. In *Proceedings of the Annual Conference of CAIS/Actes du congrès annuel de l'ACSI*. https://doi.org/10.29173/cais1037

Vincent, K., 2007. Uncertainty in Adaptive Capacity and the Importance of Scale. *Global Environmental Change*, 17(1), pp.12-24. https://doi.org/10.1016/j.gloenvcha.2006.11.009

Wale, E., Nkoana, M.A. and Mkuna, E., 2022. Climate Change-Induced Livelihood Adaptive Strategies and Perceptions of Forest-Dependent Communities: The Case of Inanda, KwaZulu-Natal, South Africa. *Trees, Forests and People*, 8, Art 100250, pp.1-10. https://doi.org/10.1016/j.tfp.2022.100250

Walz, Y., Min, A., Dall, K., Duguru, M., de Leon, J.C.V., Graw, V., Dubovyk, O., Sebesvari, Z., Jordaan, A. and Post, J., 2020. Monitoring Progress of The Sendai Framework Using A Geospatial Model: The Example of People Affected by Agricultural Droughts in Eastern Cape, South Africa. *Progress in Disaster Science*, 5, Art 100062, pp.1-12 https://doi.org/10.1016/j.pdisas.2019.100062

Washington, H., Taylor, B., Kopnina, H., Cryer, P., and Piccolo, J.J., 2017. Why Ecocentrism is the Key Pathway to Sustainability. *The Ecological Citizen*, 1(1), pp.35-41. https://www.ecologicalcitizen.net/pdfs/v01n1-08.pdf. (Accessed 26/06/2022).

Wejs, A., Harvold, K., Larsen, S.V. and Saglie, I.L., 2014. Legitimacy Building in Weak Institutional Settings: Climate Change Adaptation at Local Level in Denmark and Norway. *Environmental Politics*, 23(3), pp.490-508. https://doi.org/10.1080/09644016.2013.854967

Whitney, C.K., Bennett, N.J., Ban, N.C., Allison, E.H., Armitage, D., Blythe, J.L., Burt, J.M., Cheung, W., Finkbeiner, E.M., Kaplan-Hallam, M. and Perry, I., 2017. Adaptive Capacity: from Assessment to Action in Coastal Social-Ecological Systems. *Ecology and Society*, 22(2). Art 22, pp1-29. https://www.jstor.org/stable/26270135. (Accessed 19/07/2023)

Wilk, J., Andersson, L. and Warburton, M., 2013. Adaptation To Climate Change and Other Stressors Among Commercial and Small-Scale South African Farmers. *Regional Environmental Change*, 13(2), pp.273-286. https://doi.org/10.1007/s10113-012-0323-4

Williams, P.A., Crespo, O. and Abu, M., 2019. Adapting to Changing Climate Through Improving Adaptive Capacity at the Local Level–The Case of Smallholder Horticultural Producers in Ghana. *Climate Risk Management*, 23, pp.124-135. https://doi.org/10.1016/j.crm.2018.12.004

Xie, J. and Saltzman, S., 2000. Environmental Policy Analysis: An Environmental Computable General-Equilibrium Approach for Developing Countries. *Journal of Policy Modeling*, 22(4), pp.453-489. https://doi.org/10.1016/S0161-8938(97)00076-8

Young, K.R. and Lipton, J.K., 2006. Adaptive Governance and Climate Change In The Tropical Highlands of Western South America. *Climatic Change*, 78(1), pp.63-102. https://doi.org/10.1007/s10584-006-9091-9

Zhang, H., 2019. Research on Green Party's Ecologic.al Priority Values from the Perspective of Ecocentrism. *Francis Academic Press*, UK. pp. 179-183 https://webofproceedings.org/proceedings_series/ECOM/MFSSR%202019/MFSSR19039.pdf. (Accessed 28/07/2022)

Ziervogel, G., New, M., Archer van Garderen, E., Midgley, G., Taylor, A., Hamann, R., Stuart-Hill, S., Myers, J. and Warburton, M., 2014. Climate Change Impacts and Adaptation In South Africa. *Wiley Interdisciplinary Reviews: Climate Change*, 5(5), pp.605-620. https://doi.org/10.1002/wcc.295

APPENDIX A

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Gadu

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H21/05/11**
PROJECT TITLE	Shooting at a Moving Target: The Complexity of Evaluating and Monitoring the Climate Change Adaptive Capacity of the Local Government Institutions in the Eastern Cape Province, South Africa
INVESTIGATOR(S)	Mr S Gadu
SCHOOL/DEPARTMENT	Geography, Archaeology and Environmental Studies/
DATE CONSIDERED	21 May 2021
DECISION OF THE COMMITTEE	Approved Risk Level: Minimal
EXPIRY DATE	07 June 2024

DATE 08 June 2021 **CHAIRPERSON** J. Knight

(Professor J Knight)

cc: Supervisor : Professor M Simatele

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to submit an amendment of the protocol to the Committee. **I agree to completion of a regular progress report. For Minimal and Low studies, this is due annually on 31 December. For Medium and High Risk studies, this is due twice annually on 30 June and 31 December.**

_____ _____/_____/_____

Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX B

PROF MULALA DANNY SIMATELE
GLOBAL CHANGE INSTITUTE &
SCHOOL OF GEOGRAPHY, ARCHEOLOGY AND ENVIRONMENTAL STUDIES
Private Bag 3, Wits, 2050, South Africa
Tel No: +27 11 717 6602 | Email: mulala.simatele@wits.ac.za

20th January 2021

TO WHOM IT MAY CONCERN,

Dear Sir/Madam,

LETTER OF INTRODUCTION FOR MR. SIYAXOLA GADU

I write to introduce Mr. Siyaxola Gadu who is currently pursuing studies leading to the attainment of a PhD in environmental Studies at the University of the Witwatersrand in South Africa. Mr. Siyaxola Gadu is studying under my supervision and his research revolves around understanding the role of local institutions in climate change adaptation of rural communities in the Eastern Cape Province of South Africa.

Mr. Gadu intends to conduct fieldwork in Eastern Cape Province to investigate how to measure or evaluate the adaptive capacity to climate change of government institutions at local level and understand the complexities that are associated with developing an algorithm system that can evaluate the institutional adaptive capacity to climate change. In view of this, I am writing to request your assistance in every way possible for Mr. Gadu to conduct his research. I can assure you that the data collected will be used solely for academic purposes and there are no explicit and implicit implications for the local government and its officials.

Should you require any additional information, please do not hesitate to contact me on the details provided below.

Yours sincerely,

Prof MD Simatele

APPENDIX B

CONSENT FORM



Shooting at a Moving Target: The Complexity of Evaluating and Monitoring the Climate Change Adaptive Capacity of the Local Government Institutions in the Eastern Cape Province, South Africa

I …… agree to voluntary take part in this academic research project.

I agree that,

• My personal details will remain anonymous.	YES	NO
• The researcher may use anonymous quotes in his research report.	YES	NO
• The interview may be audio recorded.	YES	NO
• The interview may be video recorded.	YES	NO

I HAVE READ THE PARTICIPANT INFORMATION SHEET; I HAVE HAD A CHANCE TO ENQUIRE ABOUT ANY AREA THAT I DID NOT UNDERSTAND.

……..

(Signature of the Interviewee)

……

(Name of the Interviewee)

……..

(Date)

APPENDIX C

PARTICIPANT INFORMATION SHEET

Dear Sir/Madam

I am Siyaxola Gadu, a PhD Student at the University of the Witwatersrand in 2021, my student number is 0317491D. As a postgraduate student I am required to do a research project, and my thesis title is "**Shooting at a Moving Target: The Complexity of Evaluating and Monitoring the Climate Change Adaptive Capacity of the Local Government Institutions in the Eastern Cape Province, South Africa**". The aim of this study is to explore the prospect of development of a system, with standardised logarithms, that can evaluate and monitor the climate change impacts, institutional adaptive capacity, resilience, and vulnerability of local government institutions in the Eastern Cape Province, South Africa. The benefit of this research is that it will give government institutions an insight and shed light on their adaptive capacity to climate change.

I kindly invite you to participate in my project as an interviewee. You are selected to be part of the study because you meet the criteria of ideal participants. The interview will explore the climate change adaptation capacity of government institution, it will take place at your institution, or it will be virtually, and will be around 45 to 60 minutes long. I will also request your permission to audio record the interview using a digital device.

You must understand that,

1. Taking part in this study is entirely voluntary.
2. There are no disadvantages or penalties for not participating.
3. It is your right to decline to answer any uncomfortable questions that I may ask without any negative consequences.
4. You are free to end the interview at any time without any penalties.
5. Although your name or any identifying information will not be used in a final report, confidentiality and anonymity cannot be guaranteed due to the fact that your institution is aware that you are a participant in the study.;
6. The information will be stored in a password secured laptop and not disclosed to anyone but my supervisor.
7. The study will be reported via a thesis that will be published on the Wits world-wide web through Wired Space accessed through the library website.

If you have any questions or concerns after the interview, you can contact me. I will compile a report after the study. I will send you a summary of the report if you would like to obtain it.

Yours sincerely,

Siyaxola Gadu 

Researcher: Mr Siyaxola Gadu, 0317491d@students.wits.ac.za, **076 724 9936**

Supervisor: Professor Danny Simatele, danny.simatele@wits.ac.za , **011 717 6602**

HREC (NM) Secretary: Ms Shaun Schoeman, shaun.schoeman@wits.ac.za , **0117171408**

APPENDIX D

Interview Guide Questions for DEFF (National)

1. Will you be able to share the mandate of this government institution?
2. Are you able to share your function within this organization?
3. May you please share for long have you been in this position?
4. May you kindly explain which legislation guide the mandate of institution?
5. Within these legislations, may you kindly share what policies are important that guide the mandate?
6. May you please share if DEA has a climate change adaptation policy/ strategy/ plan?
7. Please share when was the policy developed, and when was it active?
8. May you kindly describe the process of developing the climate change policy?
9. May you please share which other government policies/ strategies/ plans were considered during the development of the climate change policy?
10. If yes, briefly explain why it was important to consider these particular policies/ strategies/ plans.
11. May you please share which unit is responsible for implementation of this policy, and please briefly explain the implementation process/ plan?
12. Kindly describe the achievements, challenges, and lessons of the implementation process.
13. If it is implemented at provincial and/or local level, may you kindly share if the provincial and/or local institutional capacity were considered during the development of the policy?
14. Is there funding allocated to institutions that are expected to implement climate change policies? If, yes, how are different municipalities prioritised in the allocation of funds?
15. If the local government institutional capacity were considered, how are they measured or evaluated?
16. Can this measuring or evaluating process be improved?
17. How complex is the process of measuring or evaluating the adaptive capacity of different local government in a standardised manner?
18. Is there a need to develop an algorithm system for measuring or evaluating institutional adaptive capacity to climate change? Why?
19. Do you have any other source of information that you could suggest for the benefit of this academic research?
20. Is there any other information or opinion that you would like to add/ share for the improvement of this academic research?

APPENDIX E

Interview Guide Questions for SALGA

1. Will you be able to share the mandate of this government institution?
2. Are you able to share your function within this organization?
3. May you please share for long have you been in this position?
4. May you kindly explain which legislation guide the mandate of institution?
5. Within these legislations, may you kindly share what policies are important that guide the mandate?
6. May you please share if SALGA has a climate change adaptation policy/ strategy/ plan?
7. Please share when was the policy developed, and when was it active?
8. May you kindly describe the process of developing the climate change policy?
9. May you please share which other government policies/ strategies/ plans were considered during the development of the climate change policy?
10. If yes, briefly explain why it was important to consider these particular policies/ strategies/ plans.
11. May you please share which unit is responsible for implementation of this policy, and please briefly explain the implementation process/ plan?
12. Kindly describe the achievements, challenges, and lessons of the implementation process.
13. The adaptive capacity needs to talk to the mandate of the institution.
14. If it is implemented at provincial and/or local level, may you kindly share if the provincial and/or local institutional capacity were considered during the development of the policy?
15. If the local government institutional capacity were considered, how are they measured or evaluated? If they are not evaluated, why?
16. Can this measuring or evaluating process be improved?
17. Since the local government institutions have different adaptive capacities to climate change, how is this institution go about to ensure that all their adaptive capacities are sufficient?
18. Does this institution assist in climate change adaptive capacity building/ enhancing of local governments? If yes, please explain.
19. Is there a way or a process in place that assists in prioritizing certain local government institutions over others for capacity building? If yes, please explain.
20. How complex is the process of measuring or evaluating the adaptive capacity of different local government in a standardised manner?
21. Is there a need to develop an algorithm system for measuring or evaluating institutional coping mechanism? Why?
22. Do you have any other source of information that you could suggest for the benefit of this academic research?
23. Is there any other information or opinion that you would like to add/ share for the improvement of this academic research?

APPENDIX F

Interview Guide Questions for Metropolitan Municipality

1. Will you be able to share the mandate of this government institution?
2. Are you able to share your function within this organization?
3. May you please share for long have you been in this position?
4. May you kindly explain which legislation guide the mandate of institution?
5. Within these legislations, may you kindly share what policies are important that guide the mandate?
6. May you kindly state how climate change manifest itself in this municipality?
7. May you please share if climate change adaptation is perceived as another issue that competes with other pressing issues, for resources within the municipality? Explain
8. May you kindly share if this institution has sufficient capacity or not, to adequately comply with national climate change policy? Explain
9. May you please share if the municipality evaluates or assesses its own coping mechanism to varying climate? If so, may you please detail the evaluation process?
10. May you kindly share how often does the municipality assess its own coping mechanism?
11. May you please share the chosen determinants or indicators of adaptive capacity in this municipality?
12. May you please state if these determinants and indicators are of equal importance, have equal weights, when assessing adaptive capacity? Explain
13. May you kindly state if the determinants and indicators change with changing climate in this region? Explain
14. May you kindly share if there is a scale or a system that the municipality uses to measure or assess its climate change adaptive capacity level? If not, how will the municipality know that it has achieved the goal of sufficient adaptive capacity to climate change?
15. May you kindly state what climate change policies exist in municipal level, and how are these aligned to national climate change policies/ strategies/ plans?
16. May you kindly share in what extent/ ways did the municipality contribute to the development of this national policy?
17. May you please share if the institution has a climate resilience policy/ strategy/ plan?
18. Please share when was the policy developed, and when was it active?
19. May you kindly describe the process of developing the policy?
20. May you please share if the capacity of the municipality is taken into consideration during the development of the policy? Explain

21. Does the municipality receive funding from higher government structures for climate resilience activities or it is budgeted by the municipality?
22. Are there any infrastructures that were built in response or in anticipation of climate impacts?
23. May you please share which other government policies/ strategies/ plans were considered during the development of the climate change policy?
24. If yes, briefly explain why it was important to consider these particular policies/ strategies/ plans.
25. Please briefly explain how complex is the process of considering all relevant national policies/ strategies/ plans when developing the municipal climate change policy/ strategy/ plan?
26. May you please share which stakeholders were consulted during the development of the policy? if there was consultation, why was it important to consult these stakeholders?
27. May you please share which unit is responsible for implementation of this policy, and please briefly explain the implementation process/ plan?
28. How big is the unit? (How many employees)
29. Are those employee's responsibilities strictly climate change or they have other tasks?
30. Kindly describe the achievements, challenges, and lessons of the climate change policy implementation process.
31. May you kindly share, when last was this policy reviewed or how often is/ will it be reviewed?
32. Do you have any other source of information that you could suggest for the benefit of this academic research?
33. Is there any other information or opinion that you would like to add/ share for the improvement of this academic research?

APPENDIX G

Interview Guide Questions for District Municipality

1. Will you be able to share the mandate of this government institution?
2. Are you able to share your function within this organization?
3. May you please share for long have you been in this position?
4. May you kindly explain which legislation guide the mandate of institution?
5. Within these legislations, may you kindly share what policies are important that guide the mandate?
6. May you kindly state how climate change manifest itself in this municipality?
7. May you please share if climate change adaptation is perceived as another issue that competes with other pressing issues for resources within the municipality? Explain
8. May you kindly share if this institution has sufficient capacity or not, to adequately comply with national climate change policy? Explain
9. May you please share if the municipality evaluates or assesses its own coping mechanism to varying climate? If so, may you please detail the evaluation process?
10. May you kindly share how often does the municipality assess its own coping mechanism?
11. May you please share the chosen determinants or indicators of adaptive capacity in this municipality?
12. May you please state if these determinants and indicators are of equal importance, have equal weights, when assessing adaptive capacity? Explain
13. May you kindly state if the determinants and indicators change with changing climate in this region? Explain
14. May you kindly share if there is there a scale or a system that the municipality uses to measure or assess its climate change adaptive capacity level? If not, how will the municipality know that it has achieved the goal of sufficient adaptive capacity to climate change?
15. May you kindly state what climate change policies exist in municipal level, and how are these aligned to national climate change policies/ strategies/ plans?
16. May you kindly share in what extent/ ways did the municipality contribute to the development of this policy?
17. May you please share if the municipality has a policy/ strategy/ plan?
18. Please share when was the policy developed, and when was it active?
19. May you kindly describe the process of developing the policy?
20. May you please share if the capacity of the municipality is taken into consideration when was developed? Explain

21. Does the municipality receive funding from higher government structures for climate resilience activities or it is budgeted by the municipality?
22. Are there any infrastructures that were built in response or in anticipation of climate impacts?
23. May you please share which other government policies/ strategies/ plans were considered during the development of the climate change policy?
24. If yes, briefly explain why it was important to consider these particular policies/ strategies/ plans.
25. Please briefly explain how complex is the process of considering all relevant national policies/ strategies/ plans when developing the municipal climate change policy/ strategy/ plan?
26. May you please share which stakeholders were consulted during the development of the policy? if there was consultation, why was it important to consult these stakeholders.
27. May you please share which unit is responsible for implementation of this policy, and please briefly explain the implementation process/ plan?
28. How big is the unit? (How many employees)
29. Are those employee's responsibilities strictly climate change or they have other tasks?
30. Kindly describe the achievements, challenges, and lessons of the climate change policy implementation process.
31. May you kindly share, when last was this policy reviewed or how often is/ will it be reviewed?
32. May you please share if local municipalities of this district have their own climate change responses or climate change is handled only at district level?
33. If yes, may you kindly share if this district municipality influences or assists its local municipalities, in any form, in climate resilience?
34. May you please share if the district keeps track of adaptive capacity of its local municipalities? if yes, please explain the process.
35. Do you have any other source of information that you could suggest for the benefit of this academic research?
36. Is there any other information or opinion that you would like to add/ share for the improvement of this academic research?

APPENDIX H

Interview Guide Questions for Local Municipality

1. Will you be able to share the mandate of this government institution?
2. Are you able to share your function within this organization?
3. May you please share for long have you been in this position?
4. May you kindly explain which legislation guide the mandate of institution?
5. Within these legislations, may you kindly share what policies are important that guide the mandate?
6. May you kindly state how climate change (natural disasters) manifest itself in this municipality?
7. May you please share if climate change adaptation is perceived as another issue that competes with other pressing issues, for resources within the municipality? Explain
8. May you kindly share if this institution has sufficient capacity or not, to adequately comply with national climate change policy? Explain
9. May you please share if the municipality evaluates or assesses its own coping mechanism to varying climate? If so, may you please detail the evaluation process?
10. May you kindly share how often does the municipality assess its own coping mechanism?
11. May you please share the chosen determinants or indicators of adaptive capacity in this municipality?
12. May you please state if these determinants and indicators are of equal importance, have equal weights, when assessing adaptive capacity? Explain
13. May you kindly state if the determinants and indicators change with changing climate in this region? Explain
14. May you kindly share if there is there a scale or a system that the municipality uses to measure or assess its climate change adaptive capacity level? If not, how will the municipality know that it has achieved the goal of sufficient adaptive capacity to climate change?
15. May you kindly state what climate change policies exist in municipal level, and how are these aligned to national climate change policies/ strategies/ plans?
16. May you kindly share in what extent/ ways did the institution contribute to the development of this policy?
17. May you please share if the municipality has a climate resilience policy?
18. Please share when was the policy developed, and when was it active?
19. May you kindly describe the process of developing the policy?
20. May you please share if the capacity of the municipality is taken into consideration during the development of the policy? Explain

21. Does the municipality receive funding from higher government structures for climate change related activities or it is budgeted by the municipality?
22. Are there any infrastructures that were built in response or in anticipation of climate change impacts?
23. May you please share which other government policies/ strategies/ plans were considered during the development of the climate change policy?
24. If yes, briefly explain why it was important to consider these particular policies/ strategies/ plans.
25. Please briefly explain how complex is the process of considering all relevant national policies/ strategies/ plans when developing the municipal climate change policy/ strategy/ plan?
26. May you please share which stakeholders were consulted during the development of policy? if there was consultation, why was it important to consult these stakeholders.
27. May you please share which unit is responsible for implementation of this policy, and please briefly explain the implementation process/ plan?
28. How big is the unit? (How many employees)
29. Are those employee's responsibilities strictly climate change or they have other tasks?
30. Kindly describe the achievements, challenges, and lessons of the implementation process.
31. May you kindly share, when last was this policy reviewed or how often is/ will it be reviewed?
32. May you kindly share if the district municipality influences or assists this local municipality, in any form, in climate resilience?
33. May you please share if the district keeps track of adaptive capacity of this municipality? if yes, please explain the process.
34. Do you have any other source of information that you could suggest for the benefit of this academic research?
35. Is there any other information or opinion that you would like to add/ share for the improvement of this academic research?