‘Grounding’ Ecosystem-Based Adaptation in the Western Cape Province

A thesis submitted to
University of Cape Town for the degree of Master of Philosophy in
Environment, Society and Sustainability

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Author's Declaration

This work has not been previously been submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

Signature: _____ Date: 10. February. 2020

Abstract

Ecosystem-based adaptation (EbA) advocates that well-functioning ecosystems are critical for building resilience and supporting society's adaptation to the adverse impacts of climate change. The National Department of Environmental Affairs, Fisheries and Forestry in South Africa has decided to mainstream EbA into its climate response actions, developing a strategy and set of guidelines to steer implementation. However, little work has been done to grasp different actors' perspectives and understandings of EbA, its implementation and how to link EbA to existing related projects and programmes that focus on natural resource management and ecological restoration.

This research presents findings from a qualitative study in the Western Cape that sought to investigate what EbA means 'on the ground' and how it can be actioned. The objectives for this research were to 1) unpack how government actors in the Western Cape relate to, understand and give meaning to EbA in their specific and existing work contexts and how they relate EbA to other concepts such as green infrastructure, restoration and various forms of natural resource management (NRM); 2) explore the concerns and challenges encountered and what support is needed to implement EbA within each actor's sector; and 3) interpret what the findings mean for future conceptualization, and promotion of EbA mainstreaming in the Western Cape.

Semi-structured interviews with 19 government officials and participant observation at EbA related events in South Africa were the main methods used in the research. Findings suggest that despite some conceptual confusion related to EbA, EbA can be 'grounded based on the three spheres EbA explicitly builds on; namely biodiversity and ecosystem conservation, climate change adaptation and socio-economic benefits. That said, the study also found that practitioners might struggle to successfully address climate change as one of the critical areas of EbA, due to the difficulties of integrating climate change science and projections into projects. In addition, three challenges were identified that relate to funding availability, silo mentality and the mismatch between short-term objectives and decision making in government, and the need for long-term thinking and planning. Increased climate change understanding together with effective demonstration and the use of applicable language that relates to what the different actors are already doing can help improve EbA uptake and mainstreaming, as well

as address the challenges related to conceptual confusion, funding, silo mentality and short-term thinking.

Acknowledgement

I would first like to thank my parents, Kirsti and Jon, who have been a massive support the last two years. Thank you for believing in me and for keeping my motivation up when it was low. Tusen tusen takk, dokke er så gode!

Thereafter, I would like to thank my supervisor Sheona Shackleton, who patiently guided me through this thesis. Thank you for all the feedbacks and for all the amazing opportunities, I have learnt more than I ever thought I would.

A big, big thank you to my amazing boyfriend Luke, who has told me again and again that everything will be fine and that have I got this, despite me spinning around in circles. Thank you so much the support, for your patience, and last but not least for making me litres of butternut-soup for lunch so I would not go hungry on campus. A special thank you goes to my classmates, in particular Erin, who has kept me sane in the office and took me for runs when I needed it. Caitlin and Tatjana, thank you both so much for helping me transcribe my interviews and for proof-reading my thesis over and over again.

I would not have been writing this acknowledgment without you all. Thank you!

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List of Abbreviations

CC	**Climate change**
CCA	**Climate change adaptation**
CCT	**City of Cape Town**
DEA/DEFF	**National Department of Environmental Affairs**
DEADP	**Provincial Department of Environmental Affairs and Development Planning, Western Cape**
EbA	**Ecosystem-based Adapation**
EI	**Ecological Infrastructure**
GIZ	**Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)**
IPCC	**Intergovernmental Panel on Climate Change**
NRM	**Natural Resource Management**
NBS	**Nature-based Solution**
SANBI	**South African National Biodiversity Institute**
SDG's	**Sustainabile Development Goals**
UN	**United Nation**
WfW	**Working for-Water programme**

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Chapter One: Introduction and Theoretical Overview

1.1 Introduction

Climate change (CC) is inhibiting the ability to achieve sustainability and meet development goals set by the global community and organisations. Despite global calls to curb CC through reduced emissions, such as the commitments developed during the Paris Agreement in 2015, these targets have generally not been met. As a consequence, the world is currently set to continue to experience adverse effects from CC (Chevallier, 2018). It is predicted with high confidence that the degree of health problems, poverty, environmental and economic issues will rise with global warming, even if the average temperature is kept below 1.5 °C ("pre-industrial levels"). The environmental issues caused by CC are manifold, and the outcomes of these will cause challenges, especially, but not exclusively, for countries and regions with high poverty (Intergovernmental Panel on Climate Change [IPCC], 2018). The urgent demand for climate-resilient development pathways requires global commitments to reduce greenhouse gas emissions. However, just as urgent is the need for effective ways to respond, adapt and cope with the already noticeable and projected CC impacts (Munang et al., 2013). Though ambitious mitigation efforts have been agreed on, it will not prevent the crucial need for comprehensive adaptation measures to be taken by each individual country (Sierra-Correa & Cantera Kintz, 2015; Milman & Jagannathan, 2017).

Ecosystem-based adaptation (EbA) is defined by the Convention of Biological Diversity (CBD) as the "use of biodiversity and ecosystem services as an overall adaptation strategy to help people adapt to the adverse effects of climate change" (CBD, 2009). EbA has been recognized and promoted by international organisations such as The World Bank and the United Nations (UN) (Doswald et al., 2014), and holds the potential to be a comprehensive and multifunctional strategy that draws on a variety of disciplines and sectors including nature conservation, risk management, CC adaptation and development (Brink et al., 2016). Moreover, EbA strategies can serve as cost-effective alternatives or complements to traditional and hard technological infrastructure by building on already existing natural infrastructure (Hale et al., 2009; Wamsler et al., 2014).

In South Africa, EbA has been put forward as one of the most effective ways to respond to the negative impacts of CC, and government documentation supporting the mainstreaming and

implementation of EbA has been developed (Department of Environmental Affairs & South African National Biological Institute [DEA & SANBI], 2016). Despite the governmental support and the potential to modify already existing projects and programmes in South Africa into EbA initiatives (Aronson et al., 2019), the calls for EbA have yet to be put into practice at a local level (Reid et al., 2019). The study intends to investigate the state of mainstreaming EbA in the Western Cape province of South Africa. By examining how EbA is being understood and conceptualised by government officials, the study aims to contribute towards bridging the gap between EbA theory and practice, as well as, provide further clarity on what EbA involves in this specific context to better enable and improve mainstreaming and implementation.

1.1.1 Motivation for the Study

By attending seminars at the University of Cape Town and reading relevant literature on the use of EbA, I became fascinated by the way EbA brings in different sustainable development goals (SDG's) and environmental and developmental challenges into one strategy (Reid, 2011; Munang et al., 2014). From the literature it became apparent that EbA embraces a holistic approach to CC adaptation, as it aims to both conserve the environment and strengthen social and economic outcomes (Vignola et al., 2009; Munang et al., 2014; DEA & SANBI, 2016). However, the literature also pointed towards a lack of research and evidence on how to best put EbA into *practice* (Pasquini et al., 2015; Milman & Jagannathan, 2017). This inspired the academic focus of this thesis.

Considering the expectations of the implementation and mainstreaming of EbA in the South African context (DEA & SANBI, 2016, 2017; Knowles & Bragg, 2018), combined with the novelty of the concept and its similarities to other nature-based approaches, there exists a potential for misunderstanding and confusing the different actors who will need to be involved in the implementation of EbA.

As with other broad concepts and approaches (e.g. environmental social work, stewardship), moving from theory to practice can become somewhat messier and more cumbersome than anticipated. This is especially true if there are a variety of understandings and interpretations of the concept at hand (Ramsay & Boddy, 2017; Cockburn, 2018). The quote below refers to

another new concept and approach that was introduced within the field of social work, but it can also be applied in the context of EbA:

> *'Different interpretations of environmental social work [read EbA] and a variety of related terms used to describe the concept can be confusing and impede the identification of interventions to advance environmental social work [read EbA]. In the absence of clarity translation of concept into practice is unlikely'* (Ramsay & Boddy, 2016:69)

This lack of clarity on how the concept of EbA might be translated to different sectors and how to operationalize it is likely to impede the process of mainstreaming and implementation. Moreover, as the Western Cape already has several existing nature-based programmes that could be modified to EbA, there is potential to implement this approach on a broader scale (Reid, 2011; Aronson et al., 2019). However, the same potential is also the source of the confusion of where to 'ground' EbA in South Africa but, more specifically for this study, in the Western Cape. The words 'ground' or 'grounding' are used in this thesis as an attempt to find a place and common structure for EbA in the spectrum of similar approaches. This study, therefore, sets out to unpack what EbA means for different government actors in the Western Cape, how it relates to their existing mandates and activities, how they are or envisage implementing EbA, and who they would need to collaborate with to do this.

1.1.2 Aim and Objectives

The aim of this research is to find a common 'ground' for EbA in the Western Cape Province. I attempt to do so by exploring the diversity of the meaning attached to the concept of EbA as it is being operationalized by different actors who work at the human-environment interface within the City of Cape Town (CCT) and the Western Cape Province.

My objectives are to:

1. Unpack how government actors in the Western Cape relate to, understand and give meaning to EbA in their specific and existing work contexts and how they relate EbA to other concepts such as green infrastructure, restoration and various forms of natural resource management (NRM);

2. Explore the concerns and challenges encountered and what support is needed to implement EbA within their sector and;
3. Assess what the findings mean for future conceptualization, and promotion of EbA mainstreaming in the Western Cape.

To reach of these objectives, I use qualitative methods to investigate the state of EbA in the Western Cape. The primary method was semi-structured interviews with government officials as well as participant observations at EbA related events in Johannesburg and in Cape Town.

1.1.3 Thesis Outline

This thesis consists of five chapters that can be outlined as followed.

Chapter One presents the context of the study. Starting with an introduction and subsequent motivation for the study, as well as the aim and objectives by which the research was carried out. Following this, a theoretical overview is presented in conjunction with the study context.

Chapter Two provides a detailed description of the research approach as well as the methods I used to collect and analyse the data. Any concerns and potential limitations of the study, including reflections over my position and ethical considerations will also be covered here.

Chapter Three is the first of the two results and discussion chapters in this thesis. Here Objective 1 is addressed as I aim to investigate what EbA means for different actors. It begins with an investigation of how study participants see the impacts of CC and how this might influence their approach to EbA. After that, this chapter explores how participants chose to frame EbA in their context and line of work.

Chapter Four is the second results and discussion chapter. This chapter speaks to Objective 2 and seeks to explore the challenges participants have encountered or foresee they will encounter when implementing and mainstreaming EbA. Moreover, it investigates what kind of enablers might be needed to ensure successful implementation of EbA in the Western Cape.

Chapter Five presents the conclusion that ties together the research findings and interprets what these mean for future conceptualization, implementation and mainstreaming of EbA.

1.2. Theoretical Overview and Study Context

1.2.1 Climate Change Adaptation

The urgency to respond to the growing adverse impacts of CC has resulted in the integration of climate change adaptation (CCA) strategies into many national development plans and other national policies and strategies (Doswald et al., 2014). Climate change adaptation is defined by the Intergovernmental Panel on Climate Change (Noble et al., 2014:838) as:

> *The process of adjustment to actual or expected climate and its effect. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects.*

Until recently, adaptation approaches have been dominated by hard technological and infrastructural solutions such as dams, seawalls, and desalination plants (Jones et al., 2012). Many of these measures have proven to be disruptive to natural processes and the surrounding environment (Mimura et al., 2014; Noble et al., 2014). Moreover, they often offer little or no capacity for the system to adjust to new conditions and few additional benefits besides the specifically designed function (van Slobbe et al., 2013). Thus there is the potential for them to become maladaptive (van Slobbe et al., 2013). Consequently, new ways of thinking about adaptation to climate change and sustainable development challenges has led researchers, policymakers and global leaders to put more emphasis on the role that natural resources and ecosystem services can play in facilitating human and non-human adaptation (Vignola et al., 2009; Munang et al., 2013; Mimura et al., 2014).

1.2.1.1 The Role of Nature in the Debate on Climate Change Adaptation

In 2005 the Millennium Ecosystem Assessment (MEA) came out providing a thorough report regarding the state of the earth's ecosystems and the impacts that changing and degrading ecosystems have had on human well-being (MEA, 2005). The Millennium Ecosystem Assessment divides the vital services humans get from ecosystems into four types; *provisioning services*, which are the products obtained from the ecosystem such as food, water and wood; *regulating services* which are the benefits obtained from ecosystem processes, such as

pollination; *cultural services* which speak to the nonmaterial benefits such as sense of place, recreational and spiritual values; and lastly *supporting services* which are the necessary processes for the production of the above services, such as soil formation and oxygen production (MEA, 2005; DEA & SANBI, 2016).

The overall findings of the report suggest that human activities over the last 50 years have resulted in unprecedented changes to ecosystems and biodiversity. The majority of these changes have been valuable in terms of economic growth and food security. However, they have simultaneously contributed to the overexploitation and unsustainable use of the environment (MEA, 2005). Following on the MEA report in 2005, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) published a global assessment report on Biodiversity and Ecosystem Services in 2019 supporting the findings of the MEA. The IPEBS (2019) report states that CC impacts such as global warming, rising sea temperature, and more intense and frequent extreme weather, pose further pressure on the health of ecosystems and biodiversity, leaving ecosystems degraded and fragmented. Because healthy and well-functioning ecosystems have been recognized as core elements to achieve sustainable development (Munang et al., 2013), conserving and protecting their vital services have been integrated into many national development plans (Vignola et al., 2009). As a result of the emphasis on the environment–society nexus, several nature-based approaches that use nature in seeking solutions to increase human resilience and adaptation to climate change have been promoted (Eggermont et al., 2015; Nesshöver et al., 2017; Aronson et al., 2019; IPBES, 2019). Over the years, these solutions have diversified, and some of the common terms and concepts are ecological infrastructure, green infrastructure, and nature-based solutions (NBS) (Nesshöver et al., 2017). Ecosystem-based adaptation is one of the more recent ones, which is a response specifically to CC.

1.2.2 Introducing Ecosystem-based Adaptation (EbA)

Ecosystem-based Adaptation first emerged in 2008-2009 (Mercer et al., 2012) and is a strategy that draws on the knowledge derived from the fields of nature-based approaches, climate science and sustainable development (Vignola, 2009). Ecosystem-based adaptation is frequently defined in the literature as "the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effect of climate change" (CBD, 2009:6; e.g., Munroe et al., 2012; Brink et al., 2016; DEA & SANBI, 2016; Ziervogel

et al., 2017) and is rooted in the importance of biodiversity and well-functioning ecosystem services for human well-being, as well as emphasising how the use of healthy ecosystems can play an essential role in CC adaptation (Vignola et al., 2009; Brink et al., 2016). In other words, EbA seeks to preserve and restore natural ecosystems that can protect species and the well-being of people and communities from some of the threats that results from CC (Hale et al., 2009; Vignola et al., 2009; Ahammad et al., 2013). For example, having healthy coral reef or sand dune systems can provide natural shoreline protection from flooding and storm surges (Hale et al., 2009). Furthermore, through conservation of natural ecosystems these systems can continue to provide ecological provisioning services which are important for survival, such as fish, fuel, and water. In this sense EbA builds explicitly on three main spheres or dimensions (Vignola et al., 2015):

1. Biodiversity and ecosystem conservation
2. Climate change adaptation
3. Socio-economic benefits

All EbA projects would need to address all of the three spheres simultaneously for a project to be called EbA.

1.2.2.1 The Potential Benefits of EbA

The impacts of CC are increasing at a faster rate than expected, and the scope for EbA to be implemented is broad, particularly in areas that are vulnerable to these impacts (Jones et al., 2012). Compared to other adaptation approaches, EbA has the potential to avoid maladaptation and aims to increase resilience in natural and human systems (Hale et al., 2009). Munang et al., (2013) suggest that because natural systems are inherently able to cope with a variety of hazards, maintaining and restoring these systems can contribute towards a "no-regrets" approach. "No-regrets' approaches are identified as strategies that can create benefits under the current climate as well as a potential future climate (Klein et al., 2014:917). Meaning that EbA projects, compared to other technological approaches may be able to continue to adapt and create benefits for people and community throughout a changing climate.

In addition, because of EbA's holistic consideration of the challenges of today's society (Munang et al., 2014), the strategy can deliver several co-benefits. These include carbon sequestration, water purification, reduced erosion, food security and reduced climate risk, to mention a few (Hale et al., 2009; Mercer et al., 2012; Munang et al., 2014). Examples of EbA's

comprehensive approach can be found in both coastal and terrestrial areas. In coastal areas, an EbA approach can include the use and rehabilitation of mangroves and other coastal vegetation to increase biodiversity of marine species, which can enhance and ensure food security while at the same time act as a buffer or protection for extreme climate events such as hurricanes (Hale et al., 2009). If you apply EbA to a terrestrial context, it may involve the rehabilitation of wetlands and removal of alien vegetation to improve water availability, purification and quality (Jones et al., 2012). In particular, a healthy wetland can reduce the risk of storm flood as it can absorb and store water (Black et al., 2016).

Compared to hard infrastructure such as a sea wall or canalized river, EbA options can hold the promise of being low-cost and leading to no-regrets (Hale et al., 2009; Vignola et al., 2009; Mercer et al., 2012; Wamsler et al., 2014). Moreover, several scholars advocate that EbA can contribute to multiple SDG's (DEA & SANBI, 2016) including enhancing food security (2), increasing human well-being (3), providing clean water (6), assisting cities and communities to become more resilient and sustainable (11), taking action against CC (13), and conserving, protecting, maintaining, rehabilitating and promoting sustainable use of both terrestrial and marine resources and ecosystems (14 and 15) (Munang et al., 2013; Wamsler et al., 2014; Aronson et al., 2019; Cohen-Shacham et al., 2019).

Regardless of the strong support for EbA, several challenges have been raised. Firstly, there is a lack of effective demonstration of EbA and furthermore, little quantitative evidence of EbA delivering its benefits given future climate conditions (Doswald et al., 2014). This challenge triggers questions such as: what are examples of EbA practices and how can these be implemented? Although EbA shows great promise, there is a lack of literature on the effective implementation of the strategy, and there is little research on the effectiveness of EbA practices. There is a need to translate theory into practice, and identify how we can use EbA to reach sustainable adaptation actions in the light of CC pressures (Harvey et al., 2017). Secondly, EbA requires collective action and combined knowledge from a variety of fields to ensure that projects address biodiversity and ecosystem services, CCA and socio-economic challenges. Creating these collaborations across various sectors and stakeholders can be troublesome and unsuccessful collaboration might impede implementation. Thirdly, it can be difficult to incorporating long-term climate change projections into short-term political decision making processes (Ojea, 2015). Finally, due to the novelty of EbA, there is conceptual confusion

related to EbA, as well as a lack of knowledge on the limits of EbA under a changing climate (Doswald et al., 2014; Pasquini & Cowling, 2015; Milman & Jagannathan, 2017).

1.2.3 Study Context

1.2.3.1 EbA in South Africa

In South Africa, EbA is highlighted in the National Climate Change Response Strategy White paper (2011) as an attractive response to CC (DEA & SANBI, 2016). Following on from this response strategy for EbA, several documents have been produced to help with the mainstreaming and implementation of EbA in South Africa. The most comprehensive being the "Strategic Framework and Overarching Implementation plan for Ecosystem-based Adaptation (EbA) in South Africa, 2016 - 2021" developed by the Department of Environmental Affairs (DEA[1]) and South Africa National Biodiversity Institute (SANBI). The document is a 5-year plan (2016 – 2021), which "aims to take forward EbA as a central component of South Africa´s programme of work on biodiversity and climate change" (DEA & SANBI, 8:2016). In addition to this document, two extra documents have been developed. The first is "Guidelines for EbA in South Africa", which consists of four cornerstones for EbA practices, seven principles with criteria and an additional eleven safeguards (DEA & SANBI, 2017). The second is "Entry Points for Mainstreaming Ecosystem-based adaptation, the case of South Africa" (GIZ, 2018).

The opportunities for EbA to help South Africa adjust to projected CC impacts are broad. In terms of CC impacts, South Africa will experience changes in temperature and rainfall patterns. Higher annual temperatures, more frequent hot extremes and fewer cold extremes will impact biodiversity and ecosystems which evidently will increase the pressure on socio-economic challenges (Mukheibir & Ziervogel, 2007; DEA & SANBI, 2016; Ziervogel et al., 2017). In the 20th century, there has been a steady loss of biodiversity in South Africa. Moreover, ecosystems have been affected by cultivation and urban expansion, which impacts the supply of the services provided by ecosystems (DEA & SANBI, 2016). Though a few of these natural processes can be replaced by human technology (e.g., water purification through treatment plans), many of them cannot be replicated (South Africa Risk and Vulnerability Atlas

[1] The Department of Environmental Affairs changed its name to the Department of Environmental Affairs, Forest and Fishery. In this thesis I use Department of Environmental Affairs [DEA] due to the fact that most participants referred to the department as such.

[SARVA], 2018) and this is where EbA's focus on maintaining and conserving these essential natural processes is key.

In addition to ecosystem degradation and biodiversity loss, South Africa also faces significant socio-economic challenges. South Africa ranks among the highest unequal countries in the world with a Gini coefficient of .69 based on income data. The high level of poverty and unemployment is a major challenge for the country, especially amongst the youth, among whom the rate of unemployment is as high as 50% (The World Bank, 2018). These challenges alone are difficult to combat, but with the projected CC impacts such as sea-level rise, unpredictable rainfall patterns, drought and floods, there are additional risks posed to the economy and human well-being; especially among the most vulnerable (Lo, 2016). As one of the outcomes of EbA is to create socio-economic benefits, there exists an opportunity for EbA to create jobs and mitigate the high unemployment rate in South Africa. Ecosystem-based adaptation can thereby combat both types of challenges and risk at the same time, under one strategy.

South Africa already have several environmental policies acknowledging the importance of natural systems and the sustainable management of these systems, as well as approaches focusing on sustainable development to uplift vulnerable groups from socio-economic challenges. However, none of these approaches deliberately focuses on conserving biodiversity and ecosystem services, addressing climate change and creating socio-economic benefits simultaneously (the three spheres mentioned above in section 1.2.2) which is what makes EbA stand out in comparison to other similar approaches used in South Africa. For instance, community-based natural resource management (CBNRM), focuses on two out of the three spheres, not providing any specific action related to future CC projections (DEA & SANBI, 2016). Figure 1.1 illustrates how EbA differs from CBNRM, community-based adaptation (CBA) and climate change integrated land use strategy (CLICS).

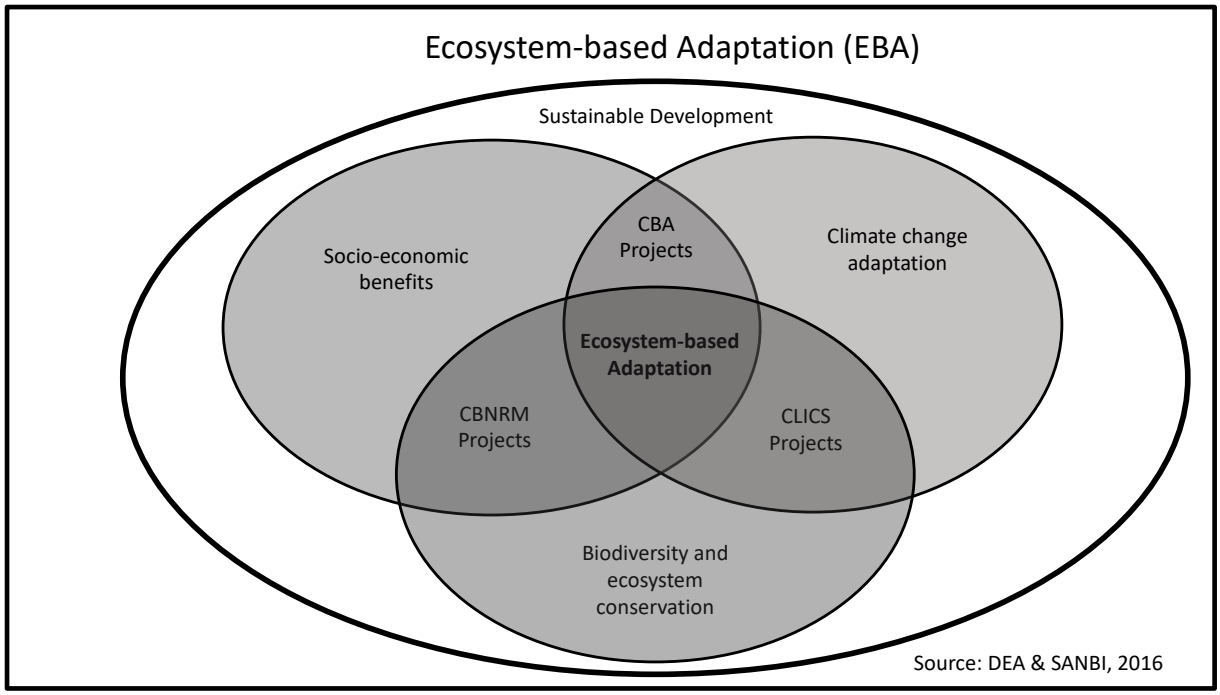

Figure 1.1: EbA compared to other similar approaches used in South Africa.

Though these opportunities exist and EbA could be mainstreamed and implemented, the challenges mentioned previously are also be found in South Africa (See section 2.2.1). A primary challenge that has been identified is conceptual confusion surrounding EbA, particularly within government (Doswald et al., 2014; Milman & Jagannathan, 2017; Ziervogel et al., 2017).

1.2.3.2 Making a Case for EbA in the Western Cape

The Western Cape is one of nine provinces in South Africa, with a population of 6.26 million people, situated on the southwestern tip of Africa. The province, which has a Mediterranean climate with hot dry summers and cold, wet winters, is recognized globally for its biodiversity. This includes the Cape Floristic Region; one of the six floristic regions in the world and the only floristic region to fall entirely within a single country and region, notable for being the smallest but the most diverse in species diversity (Manning & Goldblatt, 2012; Western Cape Government, 2018). Additionally, it is the only floristic region to be recognized as a world heritage site (Penn-Clark et al., 2020).

The natural environment in the Western Cape is not only unique, but it is also crucial in terms of the socio-economic challenges the province is facing. According to WaziMap.co.za, 16.6% of the population in the Western Cape lives in informal settlements and only 50.1% are

employed (CommunitySurvey, 2016). When it comes to service delivery such as water or electricity; 81% of the population has piped water inside the home, leaving the rest with access either from a pipe in the yard, community stand or communal water tap. About 1.9% of the population does not have access to electricity (CommunitySurvey, 2016). Urban poor areas, mainly shack dwellings, are particularly vulnerable to hazards and natural disasters.

Due to the rapid growth of these areas, people are forced to live in areas at risk, for instance, like floodplains, river banks and often in poor substandard housing and infrastructure (Faling et al., 2012). Research furthermore shows that lack of government service delivery leaves a proportion of the population directly dependent on the services provided by ecosystems (Shackleton & Shackleton, 2004; Aukema et al., 2017). Other than water, ecosystems also supply firewood for heating and cooking and rivers are used for washing (Roberts et al., 2012). On a bigger scale, the Western Cape wetlands, for instance, are valuable water resources and act as carbon sinks which are beneficial to the entire population of the Western Cape (Iqbal & Shang, 2019; Naidoo et al., 2019).

The pressure to address the socio-economic issues in the Western Cape province will become even more important in the future as extreme climatic events will intensify due to CC. According to Faling et al., (2012), the Western Cape together with the Northern Cape are expected to be most at risk from future CC in South Africa. Most recently, the region experienced a severe drought, but is also highly subjected to flooding and fire (Mukheibir & Ziervogel, 2007; Ziervogel et al., 2016). With the variety of challenges ahead it is important to put forward a strategy that is holistic in its approach, like that of EbA.

i Drought, Fire and Alien Invasive Species

The 2015-2018 drought that occurred in the Western Cape was the worst drought experienced since 1904 (Botai et al., 2017; Hogesteeger et al., 2018). The drought gained global attention for its effect on Cape Town, the most populated area in the Western Cape. The water shortage was unprecedented and resulted in the government implementing rigorous water restrictions as well as the Day Zero-campaign to keep the taps from running dry. As the Western Cape water system is heavily dependent on rain and with only a minority of the citizens having access to alternative water sources such as groundwater and back-up water tanks, it became a number

one priority to save water and find alternative sources of water in the future (Hogesteeger et al., 2018).

The Western Cape is also facing challenges related to wildfire. Though the natural fynbos vegetation in the Western Cape is dependent on fire to complete its life cycle (Hope et al., 2012), too many frequent fires can lead to a loss of fynbos species and a homogenising effect on the landscape (Dzikiti et al., 2013). A recent increase in fire frequency can be attributed to arson, higher population of alien invasive species and the lack of rainfall that the Western Cape has experienced in recent years (Hope et al., 2012; Dzikiti et al., 2013). The presence of a high number of alien invasive species also results in hotter, faster burning fires which are detrimental to the local fynbos. It is not only the fire strength and speed that has been affected by invasive alien species, but many of the alien invasive trees species, such as *Eucalyptus globulus*, also known as blue gum, utilize more water than indigenous species. Such invasions have a negative impact on water security and the regrowth of natural vegetation (Wilgen, 2009). Furthermore, invasive plant species produce more seeds and are faster-growing after fire (Wilgen, 2009). This dominance places large amounts of pressure on the indigenous plant species and therefore also the unique and irreplaceable biodiversity of the Western Cape.

Though these hazards have negative impacts on human well-being and the economy, they have also helped increase society's' attention towards the importance of ecosystems, their services and the negative impact CC has on these services (See Chapter Three, section 3.3.1). Already there are several NRM projects and programmes that aim to keep ecosystems intact in order to ensure the delivery of crucial ecosystem services, such as water. In particular, the working for-programmes that have been implemented in the Western Cape are examples of such programmes. The Working for Water-programme (WfW) is one of the biggest of these programmes and was put in place in 1995. Working for Water's main objective is to remove alien invasive species to reduce the risk they pose for humankind in terms of water security and the functioning of the natural environment (Department of Environmental Affair [DEA], 2019). Other important programmes include Working on Fire, Working for Wetlands and Working for Ecosystems. All of these programmes are also part of the government's initiative to address poverty and unemployment in the region and the majority of the Working for-Programmes workers are from low-income areas (DEA, 2019). Other examples of initiatives are the Stewardshipand LandCare programmes. Both are government initiatives. Stewardship is an approach to secure land and biodiversity priorities areas through entering agreements with

private and communal landowners, led by conservation authorities (SANBI, 2015; Cockburn, 2018). LandCare programmes aim to provide support to farmers for sustainable management and use of agricultural natural resources (Cockburn, 2018).

In the context of all of this activity, the scope for EbA mainstreaming and implementation in the Western Cape is enormous. As it stands, most of the programmes mentioned above are relevant to EbA with potential to translate into EbA strategies (Aronson et al., 2019). Ecosystem-based adaptation can provide the opportunity to merge a CC focus with the already existing approaches that are set in place to maintain, restore and enhance ecosystem services.

Chapter Two: Research Methodology

2. Introduction

This study used a qualitative approach to collect and analyse data. The primary research method was semi-structured interviews with 19 participants, all of whom were government officials. Moreover, the study applied participant observation methods at a workshop and two conferences related to EbA in South Africa. This chapter provides a detailed description of the methodology and the methods used in the study. The limitations and constraints of both the methods and the study are also discussed. Ethical considerations have also been included.

2.1 Research Approach

The objectives for the study and the choice of research approach are closely linked. The objectives were motivated by the need to investigate how the calls for EbA are being put into practice at the most local level and how EbA is being conceptualized and operationalized by government officials in the Western Cape. Because of this particular interest, the study naturally took an inductive research approach in the sense that the researcher is led by the participants' experiences, thoughts and perceptions (Bernard, 2011) of EbA and not from preconceived ideas or hypotheses. Though the literature and theoretical perspectives regarding what EbA is and the challenges of mainstreaming and implementing EbA gave insight into what the situation with EbA in the Western Cape might be like, these theoretical perspectives were not instrumental to the research approach and data gathering. The study was interested in participants' opinions of EbA, how they understand EbA and work with EbA. I, therefore, applied participant observation at EbA related events in South Africa to gain an overall insight of the state of mainstreaming of EbA in South Africa and semi-structured interviews with government officials and actors from government organisations. This dual approach allowed me to advance my understanding of some of the themes that emerged from the observations, while leaving open the possibility of discovering new themes, topics and perspectives on EbA from the interviews.

As mentioned above, information from the participant observations helped me gained a general insight into themes, topics, challenges and enablers, and areas of tension related to EbA, as well as helped me to find key actors to interview within the government. This information also

influenced the set-up of the semi-structured interviews I conducted with government officials from local, provincial and national government department and actors from government organisations. Most of the interviews were conducted one on one and during which I would incorporate a simple version of the net map tool-box exercise. This is an exercise that had the participants visually express what a potential EbA project would look like and which other actors and institutes would need to be involved. The semi-structured interviews gave a deeper understanding of the different perspectives on EbA in the Western Cape, as well as insights into the EbA planning process and a clearer picture of actors' understandings of what an EbA project is.

After each observation and interview I wrote down everything I remembered and stood out from the recent interaction. This could for instance include how actors talked about EbA (were they positive, negative, curious, annoyed etc.?), what kind of questions did they have about EbA, what challenges were brought up and were some challenges more frequently raised than others, etc. Furthermore, I consistently drew on the idea of reflexivity. Reflexivity is recognized as an important strategy when collecting qualitative research. It refers to the process of self-investigation, a continued internal dialogue and critical-self-evaluation of the researcher and researcher position, and how that position affects the research process (Creswell, 2013; Berger, 2015). In particular, I would be aware of how interviews went; what went well and what can be improved. I also reflected on my position as a researcher, and if I influenced any of the answers by the way I asked the question or behaved.

Moreover, I practised reflexivity to inform my interpretation for the data analysis. Through categorising my thoughts and experience after an observation or interview I was over time able to identify themes and topics, communalities and divergences, new or often used terms and classifications which was a first step in the thematic analysis used to analyse the data. Once I had gained an idea of main topics, I used Nvivo to help me categorize and analyse the data in a more structured manner. Figure 2.1 below, visually expresses my research approach from start to finish.

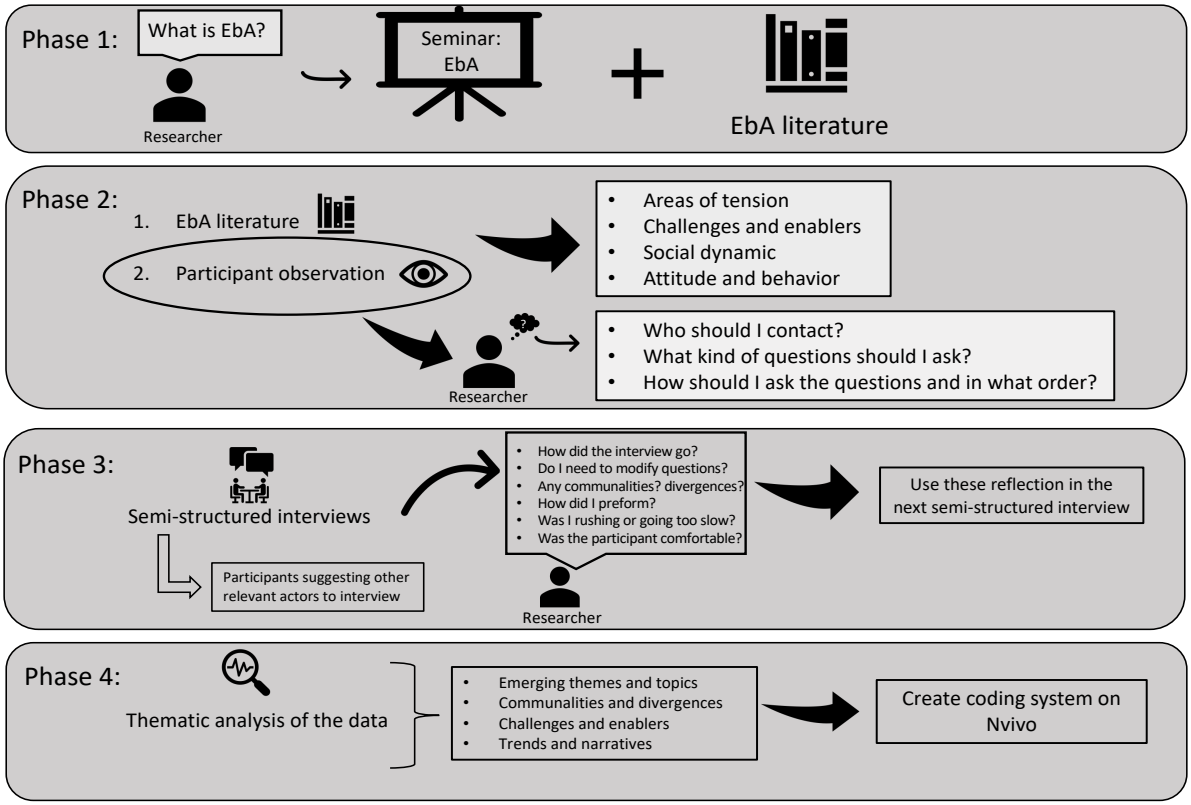

Figure 2.1: This figure describes my research approach focusing in on how I used reflexivity from start to finish.

2.2 Research Area, Participant Identification and Recruitment

Aside from the conference in Johannesburg, all my data were collected within or in close proximity to Cape Town. There were three main reasons behind undertaking my research in the Western Cape and in close proximity to Cape Town. Firstly, I had easy access to the stakeholders. The fact that I live in the province where the interviews would take place was useful as my participants had tight schedules as employed government officials. It allowed me to be flexible and also to attend the more spontaneous interviews and events with actors who initially did not have time.

Secondly, a study from Pasquini and Cowling (2015), shows knowledge and understanding regarding CC mitigation and adaptation was poorer in the local municipalities outside of CCT municipality, which also meant that finding empirical evidence on EbA implementation would be difficult in those areas. This statement, as well as CCA being a focal point for the CCT (City of Cape Town, 2017), was contributing factors for selecting the CCT municipality as a research site alongside the Western Cape provincial government.

Thirdly, the Western Cape, and in particular CCT, has a strong relationship with the universities in the province. The University of Cape Town has several networks focused on developing robust climate information; several of these have worked with or closely with CCT and the Western Cape Government (Ziervogel et al., 2016). Lastly, because of the pre-existing good relationship between the University of Cape Town, City of Cape Town and the Western Cape government, it was relatively easy to contact government officials.

As this research aimed to interview government officials, I started identifying relevant departments and stakeholders in local, provincial and government organizations. Looking through both CCTs and the Western Cape government policies, strategies and planning documents was an essential part of the process. This gave me the names of actors, departments and organisations to contact, as well as an idea of their perspective and goals in terms of CC matters and, furthermore, what they want to portray to the public (Spires et al., 2014). The National DEA and SANBI were key actors in the development of the "Strategic Framework and Overall Implementation Plan for EbA in South Africa" and finding participants within DEA and SANBI was a priority. However, as EbA requires collaboration across different government sectors (Klein et al., 2014), I wanted a diverse group of participants that came from both a biodiversity and CC perspective, as well as those involved in the city and regional planning and community development. I also used my supervisor's contacts and, in particular, the first workshop I attended to find participants. Table 2.1 below presents an overview of the departments the study participants were from.

Table 2.1: This table shows from which government department the participants for the semi-structured interviews were from.

National Government	Provincial Government	Local Government	Government organisations
- Department of Environmental, Forestry and Fisheries	- Department of Agriculture, forestry and fishery (DAFF) - Department of Environmental Affairs and Development Planning (DEADP) - Department of Human Settlement	- Environmental Management Department - Recreation and Park Development	- SANBI - GreenCape - CapeNature

	- Department of Economic Development and Tourism		

I contacted most participants via e-mail. I formed a document that summarised my research in short, which helped the administrators of the different departments and organisations I approached to direct me to relevant participants. To interview participants from CCT, I sought the permission for research from the Organisational Policy and Planning Department. I used a "snowball"-sampling strategy to identify new participants to interview. In the literature this is also referred to as chain–referral sampling, which implies key actors giving me suggestions of other relevant actors to interview (Bernard, 2011). I had 19 participants in total. The majority of the interviews were performed one to one during working hours. Of the 19 interviews, two were conducted via Skype, and I had one interview with two participants at the same time. During the latter interview, I would ask the questions and the participants would answer separately. The reason for interviewing two participants at the same time as due to time constraints.

2.3 Methods

2.3.1 Participant Observation

I conducted participant observation at two conferences and one workshop. Both of the conferences were hosted by the South African Institute of International Affairs (SAIIA), in Cape Town and Johannesburg. The latter was a bigger event where multiple actors from different African countries came together and shared their experiences of implementing EbA, mainly in marine and coastal areas. The workshop was hosted by DEA and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and it focused on Western Cape stakeholder's engagement with EbA. I used participant observation mainly as a form of reflection but also as a point of reference as to what problems and challenges the Western Cape faces when it comes to implementing and mainstreaming EbA.

In terms of my research, I took on role of being a participant observer. During the events, I had a *dual purpose* and was more *explicitly aware* of the social dynamic relating to EbA. Spradley (1979) explains that both a participant and a participant observer come to a social situation with one purpose in common (1) to participate and engage in the activities. However, the

participant observer has a second or *dual purpose* (2) to observe the activities, people and physical aspect of the situation. In addition, the participant observer is more *explicitly aware* of things that are normally blocked from our awareness (Spradley, 1979).

In this sense, my research might not meet the requirement of traditional participant observation. Traditionally the researcher would for instance live in the context of the study for an extended period of time, actively engage with daily routines and activities and use everyday conversation as an interview technique (DeWalt & DeWalt, 2011; Creswell, 2013). However, I drew on some of its methods such as *dual purpose* to gain a greater understanding of any tensions, different departments' attitudes towards EbA and the concerns and issues they had and why. I also drew on *explicit awareness* to notice, for instance, the groupings that advocated or that were more sceptic of EbA and why this might be. Besides, participatory observation can also offer a more relaxed and informal setting to talk to different actors. Often at these workshops and conferences, I was able to converse with the attendees on the topic of EbA and other issues related to CC adaptation.

During the observation, I made notes on what was being said and what social dynamics were brought up and what attitude towards EbA were shown. Later on, I went through my notes and wrote a more thorough and detailed review of the event, where I included more of my thoughts, reflections and perspectives. This is where I drew on the idea of reflexivity. These reflexive thoughts also informed my interview set-up in terms of how to start the interview, the different departments' knowledge on the topic of EbA, and what to expect in terms of challenges and opportunities for EbA.

2.3.2 Semi-Structured Interviews

In order to grasp participants' understanding of EbA, explore potential challenges related to EbA implementation and mainstreaming, and identify what support they might need, I selected semi-structured interviews as my primary data collection procedure. Before going out to the field, I prepared a set of guiding questions inspired by my observations from conferences and the workshop, in addition to the EbA literature (Newing, 2011). I divided the set of questions into four topics. The first topic consisted of questions regarding the participant's line of work. I wanted to gain an understanding of their work and the kind of activities they do on a day-to-day basis. It was also intended as a way of easing into the interview and starting the

conversation. The second topic was related to their perception of CC, CCA and the role of nature in adaptation to CC. Since I was unsure about how much they knew about EbA, I found it useful to ease into the topic of EbA by asking questions about CC. This gave me an idea of what their knowledge consisted of in that field. For some participants, CC is an everyday matter, while other participants rarely engaged with CC information. The chances of the latter knowing much about EbA was small. Therefore, I prepared a description[2] and definition[3] of EbA and used it to steer the conversation towards EbA.

The third topic aimed to unpack how these participants relate to, understand and give meaning to EbA in their specific context and existing work. Furthermore, on the same topic, I touched upon how they have planned for, mainstreamed and/or implemented EbA. The fourth and last topic was linked to the opportunities and challenges they have encountered or foresee when planning and implementing EbA. Table 2.2 provides examples of the questions I asked related to the different topics.

[2] To describe EbA I drew on the "Strategic Framework and Overarching Implementation plan for Ecosystem-based Adaptation in South Africa, 2016-2021" developed by Department of Environmental Affairs and South African National Biodiversity Institute.
[3] I used the definition from Convention on Biological Diversity (CBD, 2009:6)

Table 2.2: Examples of questions asked in the semi-structured interview

Topic one: Participant's work	- Can you tell me a little bit about your work description and responsibility?
Topic two: Participant's CC understanding	- How do you think about CC / What is CC to you? - How familiar are you with the term CC adaptation?
Topic three: Understanding and meaning of EbA	- Can you tell me what you know about EbA? - What is your understanding of EbA
Topic four: Opportunities and challenges	- Have you been a part of a project where EbA has been a part of the strategy? Or other projects that included related concepts? - Can you tell me what worked or did not work in that project? - Can you foresee any challenges in planning and implementing EbA?

An additional part of the interview was a simpler version of the net-map toolbox exercise (Schiffer, 2007). This exercise was developed to assist researchers in mapping important actors, relations and potentially missing relations in different social networks. Moreover, it allows the researchers to understand the flow of knowledge and how decisions are being made (Schiffer, 2007). I used this method to enable the participants to visually express what an EbA project would look like in terms of actors, stakeholders and departments, and how they conceptualize the process of planning and implementing EbA (Schiffer & Hauck, 2010). By drawing and using different colours, participants expressed how the actors are linked or not linked, how influential they are and what the different goals are. Often participants selected projects that they have either been a part of or projects that are currently on-going.

Though I had an interview guide with me to ensure I covered the essential topics, I made the questions open-ended to allow the interviewee direct the order of the questions (Newing, 2011). For instance, if there was a correlation between their day-to-day work and implementing EbA, I would sometimes skip the second topic (CC and CCA) and go straight onto asking questions

regarding EbA. During the interview, I would evaluate if I needed to go back to the second topic for more information. This is one of the advantages of semi-structured interviews; the ability to vary the order of questions and let the interview flow naturally and potentially delve deeper into particular topics compared to others (Bernard, 2011; Spires et al., 2014). Another positive aspect of a semi-structured interview is that it is a relatively inexpensive and quick way of gathering data (Lamont & Swidler, 2014).

Often, I would detect certain contradictions in my participants' answers. For instance, in the beginning, some would be positive towards EbA in South Africa and the Western Cape, but as the interview continued, they would become more negative in their attitude towards the strategy given that they found it troublesome and hard to implement in the context of their work. Lamont & Swindler (2014) explains that rather seeking the interviewees "true" opinion and facts, one should try to understand the *cultural framework* the interviewee has available to think about a question or a problem (161:2014). The different answers that were given to a question were influenced by what aspect of their life they were answering from. Holstein and Gubrium (1995) refers to this as "active interviews". "Active interviews" build on the thought that the interviewer and the interviewee are constructing meaning together, basically working together to find different narratives and perspectives on a certain topic by engaging and investigating the variety of meaning and opinions attached to it (Holstein & Gubrium, 1995). For instance, if I asked the question "What does CC mean to you?" they might answer it from a very personal perspective and later on talk about what CC means in their working environment. In this sense, the interviews I conducted did not necessarily give me "true" answers, but rather, I was able to grasp different narratives of EbA and EbA-like activities from different and sometimes the same participant (Holstein & Gubrium, 1995; Lamont & Swidler, 2014)

2.4 Data Analysis

I recorded all of the interviews on my laptop. This was a conscious decision as I did not want to take notes and have any distractions during the interviews. However, straight after an interview I attempted to find a location, (a café or at home) where I could make notes on what stood out; interesting pauses, hesitancies, the participant movements and how I felt the conversation flowed and where it did not. I also made comments and remarks about my experience of the interview; if I felt I was rushed or moving too slow. Drawing on the idea of reflexivity was the first step of data analysis, and also helped me reflect on how I asked the

questions and consider ways to make the next interview go smoothly. It furthermore made me notice communalities which would help me categorize my findings.

The next step was transcribing the interview. This was very time-consuming. However, it helped me go through the interviews 'bit by bit' and allowed me to make comments as I went along, in a way that I was unable to do during the interview. Due to the limited timeframe and to language barriers, I hired assistants to help me with the transcribing. For a more thorough analysis of the interviews, I used the data software Nvivo. Nvivo was specifically developed for analysing qualitative data such as text, video, and in this case, transcriptions of interviews. The Nvivo software enables you to start the coding process of the material you have in a structured manner. This type of analysis is also known as thematic analysis and is widely used in qualitative research (Braun & Clarke, 2012). Thematic analysis is an overarching approach in data analysis; however, the overall focus is on examining themes and patterns from a research. The themes can either be pre-installed prior data collection or, like in this research, the different themes emerge from the data collection (Braun & Clarke, 2012).

The first step in the thematic analysis of this work was to create "cases". Here I organized my participants depending on what government level they worked at (Local departments, Provincial departments, National departments and government organisations). After that, I made "nodes" which are containers for coding themes and topics. Examples of nodes are: "*Participants description of EbA", "Challenges",* etc. These nodes can also have a "child node" to separate information within a main node. For instance, in my case, under "*Challenges",* I found that funding was a repetitive challenge for my participants, and I would, therefore, make a child node under "*Challenges"* called "*Funding"*. Since I already had categorised participants by where they worked, I was able to see if participants from a particular government level or particular government organisations had similar or different challenges and how it compared to other sectors of government. For example, in terms of challenges, I found that *funding* was seen as a greater issue and mentioned a lot more by participants working for local municipalities and government organisation than for participants working for provincial and national government (see section 4.1.1). The last step was to run queries, which allowed me to search for words, concept and phrases. Now, I was able to look for common terminology, patterns and trends that were used to describe EbA, the challenges faced and various support mechanisms.

2.5 Reflection on Researchers' Position

Given my approach to data collection and data analysis, there are ways in which the researcher can affect the knowledge produced in the observations and interviews. Being in an interview setting, there are several social dynamics related to who I am as a researcher and who my participants are as government officials. For instance, some participants and especially those who felt they were not familiar with the topic, would express concern related to not saying the 'right' things or not providing me with enough information on the topic. In other situations, I could be the one to get insecure and feel I was asking too simplistic questions for the participants. These situations are examples of the dynamics that may have affected the narratives told in the interviews and observations.

2.6 Limitation of the Research

For this research, attending more events that dealt with EbA, and thus undertaking more participant observations might have given me a more thorough and richer understanding of the different opinion and meanings regarding EbA. It would have been beneficial to have held interviews with individuals from a broader range of government departments due to the cross-sectoral nature of the EbA strategy. However, it was time consuming and difficult to arrange meetings and interviews with very busy government officials, and I was limited by the time I had for this mini-dissertation.

2.7 Ethical Considerations

I read and understood the University of Cape Town Code of Ethics (2012) and I
made sure to adhere to the guidelines given. The ethical clearance for this research was obtained from the ethics board of the Faculty of Science at University of Cape Town, with the approval code: **FSREC 07 – 2019.** At the start of each interview, a consent form was issued, and all participants were informed on the purpose of the study, their right not to participate or not to answer and their ability to withdraw at any point of the interview and study. I understood that I was conducting interviews in a small community of people that required keeping names and positions confidential. In this thesis, I refer to participants as participant 3,4,5, etc.

Chapter Three: Participants' Understanding of EbA

3. Introduction

This chapter provides the results related to objective 1, which aims to unpack how study participants understand and interpret EbA in their line of work. Before asking questions about the core focus of my research, namely EbA, it was essential to first get a picture of how CC is understood by participants who represent the various departments and government organizations in the Western Cape. It can be argued that the ability to grasp and engage with EbA is linked to how well different actors understand and interpret CC. For example, how CC is seen by leaders in different institutions and departments has been found to contribute to how these institutions and departments approach and deal with CC in their policies, and in their development plans and practice (Lorenzoni & Hulme, 2009).

Therefore, in the results section that follows, I start by considering what CC means to participants, and their views and understandings of CC and its impacts. I then unpack the participants' understanding of EbA. The first step in doing this was to investigate participants' knowledge of EbA, thereafter their examples of EbA, and lastly how they frame EbA. In the discussion, I start by exploring the links between linking CC understanding and EbA, followed by a discussion around some of the confusion related to EbA. Thereafter, based on the findings from this research and the literature, I attempt to 'ground' what EbA means to the government officials who are required to implement it in the Western Cape.

3.1 Exploring Views on Climate Change in the Western Cape

3.1.1 Participants Views of Climate Change and how Recent Events have Triggered Climate Change Awareness

The consensus from participants was that CC is real, and it does affect their line of work and their personal life in one way or another. Participants would often view the impacts of CC in relation to their work. For example, conservationists tended to be more concerned about the impacts of CC on ecosystems and biodiversity. On the other hand, participants working with housing and community saw the impacts from CC through the perspective of human well-being and, moreover, how certain populations become more vulnerable due to, poor housing, lack of financial capital and living in areas that are prone to climate hazards such as low lying areas and river banks.

One participant who described the evidence of CC in his work is working in the agricultural sector. This participant mentioned that his first encounter with CC was as early as 1981. After a flood incident, he noticed a significant change in the soil condition, describing it as less 'resilient' than prior to the flood. Though he noticed a change, he only related this to CC in hindsight; CC was more of an "out of the box" (i.e. not something many people normally thought about) kind of thinking back then. The majority of participants also reported how they have observed that the understanding of CC has evolved from something that was thought of as 'faddish', or futuristic, to something that is facing us today. Table 3.1 provides some of the quotes from participants speaking on this matter.

Table 3.1: Participants' response on how they view climate change.

Participant 1	"CC is the biggest challenge of the 21st century."
Participant 7	"I think critically CC has become something that people initially thought was on the horizon or would happen and now people are realizing what is happening and that it is happening in a faster rate and the impacts are being felt more now. More than they have been before."
Participant 8	"We have found ebbs and flows throughout the political environment in terms of how popular CC was as a theme. I think South Africa struggles because CC for a very long time was seen as a future problem and therefore issues of housing and joblessness were much more pressing, so that is certainly something that I have seen changing."
Participant 13	"I think it is one of the most important phenomena in the world today. It is something that is still relatively recently known about, when I started out as a professional in 1981, I don't recall CC being mentioned and if it was, when I started to pick it up probably in mid 80's, it was almost 'faddish' and 'out the box'-thinking."
Participant 17	"I mean the biggest change over time has been that it (CC) is something we cannot do anything about or that it (CC) is *out there* and not something that is not really happening here."

Participants mentioned that one of the main reasons CC is receiving more awareness in the Western Cape, is due to the various disasters we are now able to link to CC. These are events such as drought, fire and flooding which all make the impact of CC more tangible. In particular, the drought that hit Western Cape in 2015-2017 was mentioned by more than half of participants as a strong contributing factor to this growth of CC awareness. Table 3.2 illustrates how participants spoke about the recent events.

Table 3.2: Participants opinions and attitudes towards recent hazards and their relation to CC.

Participant 10	"I mean it was a terrible time this drought, but I think it solidified for a lot of people that CC is now its not a future problem, it's a now problem."
Participant 2	"Even the drought in Cape Town. Everybody started talking about CC and these are the impacts of CC. So, one of the positive things the drought did was to raise awareness which was not there before."
Participant 4	"CC definitely for us and for me and anyone in the Western Cape is when we start experiencing the drought and fires, it definitely starts there."
Participant 3	"And until something like a drought happens or a flood or a fire, when it actually become tangible in the long-term economic effects and social effects then it started becoming a little more pressing on the agenda."
Participant 14	"The water crisis has been 'fantastic' for a lot of environmental aspects because people are saying 'Okay' you know."

3.1.2 Different Levels of Motivation and Engagement with CC in Participants' Work

Despite events, such as the Western Cape drought enhancing awareness and understanding, the participants had very different levels of engagement with CC matters in their work context. Though the events of fire, droughts and floods have increased many participants awareness of CC, they showed different levels of engagement with CC in their workplace. For sectors that deal with environmental challenges such as Department of Agriculture, Forestry and Fisheries, SANBI, DEADP and CCT's Environment Management Department, engaging with CC and its impacts are an integral part of the job. For instance, the Environment Management Department of CCT has its own CC unit that actively works to facilitate and implement CC

policy. The same department is also developing a Green Infrastructure program for the city, which takes CC into account. These participants were very confident in the way they integrated their understanding of CC into their work, and it almost felt natural for them to do so. One participant expressed that *"Climate change is more of a lens through which we look at the broader opportunities and risk that are posed, specifically in my unit the risk to water"* (Participant 3). Another said *"Climate change is kind of our overarching umbrella strategy. We realize everything that we are planning to do, are doing and want to do in some way, shape or form has to ultimately address the potential impact and risk of climate change and in some shape or form be mitigating those"* (Participant 7).

However, despite the recognition of CC by government departments and government organisations that work closely with environmental challenges, some were doing better than others. For examples, although CapeNature and SANParks are committed to mitigating environmental challenges, participants from these organisations expressed little or no integration of CC into their daily work. For instance, one would assume that SANParks, as an organisation that is considered to be one of the implementing branches of the government for environmental work and conservation, would include CC projections, knowledge and information in its plans for managing national parks in order to conserve and protect biological diversity appropriately. However, when I asked participants how "climate change is mentioned at your workplace", she answered that CC is *"definitely a buzz word in SANParks"*. It is important to note that this does not indicate that these government organisations are neglecting or not attempting to engage with CC. Many departments and government organisation have included CC projections and considerations into their plans; however, dealing with CC is complex, challenging and difficult, which may hamper action. Another example is a participant from CapeNature who struggles to understand how to integrate CC information into his work:

"It is not well understood (CC), and we got a lot of scientific publication that are quite generic. It is difficult interpreting those and fitting them to conditions we are experiencing now. For instance, we are in a drought, and is it worse because of climate change, (or) is it same? Are we going to expect more droughts? There are some generic comments that we are going to get higher rainfall for a shorter period. But when is this going to start and when do we pick it up and how do you predict it, it is quite difficult on the ground" (Participant 19).

Despite the limiting 'active' engagement with CC matters, several participants who work closely with ecosystems, biodiversity and conservation (both on the ground and in research and policy) actually do perform many activities that can be considered CCA. However, they would not mention or see these activities as contributing towards CCA. These participants would instead explain their reasons for certain activities in relation to the importance of protecting ecosystems and biodiversity. Though the link to CC was there in terms of, for instance, removing alien invasive trees to increase water availability or rehabilitating sand dunes, these participants was not 'conscious' of the fact that they may be contributing to CCA. Instead, they rather saw their activities as a conservation measure. Because of this lack of recognition that certain activities they perform could help respond to the adverse effects of CC, they could also miss out on funding opportunities that support CCA. Participants 17 explains:

"*I came from an alien species-background, CC was not my background. I have kind of thought as much as adaptation makes sense, we need to adapt, but I really didn't think about it. Then last year I was supposed to apply for green climate fund and we thought we were being very cool and innovating by trying to do fancy rain water harvesting systems and all kinds of greening activity and they told us "no, you should be doing that anyway that's not innovative that's mitigation and adaptation is about how you help people respond". But I thought 'okey,* ***this is not what we do, that is not how I think'****... so I really struggled to come up with what I was supposed to be doing in that context. Then having had that in the back of my mind I started thinking and I think maybe there are a lot of people doing adaptation they just haven't called it that*."

Those who work more indirectly with environmental changes and challenges, such as Department of Human Settlements and the Recreation and Park Department, have less of a CC lens incorporated into their work and are more likely to think of it as something that does not pertain directly to them. Nonetheless, it is essential to note that just because it does not pertain to them, it does not mean that they have discarded the issue of CC. Rather, because CC is not integrated into their mandate and workplans, it is not considered a priority: *"I would say that we, in a way, are aware of climate change, but I don't think we are necessarily having that discussion. We are having a discussion as to how do we deliver our services"* (Participant 11).

3.2 Unpacking EbA in the Western Cape

3.2.1 Participants' Knowledge and Reflections of EbA

As a first step of unpacking EbA in the Western Cape, I wanted to get an understanding of participants overall knowledge of EbA. I therefore started by asking questions such as "tell me what you know about EbA". There was a trend among participants who had a more integrated CC lens in their work to have more knowledge and be more enthusiastic towards EbA, while the participants who had less of a CC lens were more likely to have limited knowledge or no knowledge at all of EbA. For instance, participant 19 (mentioned in section 3.1.2) said it was challenging to interpret and merge the scientific information on CC with his work on the ground. This participant was less knowledgeable on the topic of EbA as well. While participant 8, who has been looking into and actively engaging with CCA since 2009 and, while working for the DEADP, been involved in CCA discussions was more elaborative on the topic of EbA. In general, almost all of the participants from national DEA and Provincial DEADP, together with SANBI, who are the main contributors to the EbA documents in South Africa had, not surprisingly, great general knowledge on the topic of EbA. Overall, the knowledge of EbA depended on individual and organisational knowledge of CC, their work mandate and their involvement in projects related to environmental matters.

My results show that out of the 19 participants, 16 had heard about EbA. However, six of those 16 had difficulty explaining and grasping what EbA was about, while the rest (10) were confident in their understanding of EbA. I often felt that participants who had heard about EbA, but who had not yet engaged with it, often got overwhelmed by questions such as "can you tell me what you know about EbA" or "what is your understanding of EbA". It seemed as though they did not have the words to comfortably and confidentially express what it is. Table 3.3 below shows various responses from participants who had heard about EbA. The responses below shows that most participants often base their understanding of EbA to ecosystems and biodiversity, and less on the other two dimensions of EbA, namely CCA and socio-economic benefits.

Table 3.3: Quotes from participants when asked about how they understand EbA

Participant 9	"Life has to continue, developments have to continue, and people need to survive, but how are people coping with those changes? How is the ecosystem coping with the changes? We are also considering that coping mechanism in how we are planning for development and our blueprint for development. That is how I understand ecosystem-based adaptation. Being sensitive as well in their decision making to biodiversity and the role of biodiversity in their lives".
Participant 3	"For me (EbA) it is a combination of things and it (EbA) kind of brings together a variety of different adaptation strategies, things like community-based adaptation and a variety of others, and it is trying to find the sweet spot between the three criteria's. The social, the environmental economy as well as the political. And tries again to find that central spot".
Participant 15	"It is the use of biodiversity and ecosystem services to help people to respond to CC impacts".
Participant 13	"Very simply it is adapting to CC through restoring and enhancing our ecosystems".
Participant 6	"For me the word ecosystem-based adaptation just focuses on ecosystems, and you have to adapt and using the ecosystem to buffer yourself from CC that is happening and that is all that it is there is nothing more".

While majority of the participants mainly linked EbA to restoring and rehabilitating ecosystems and biodiversity, others linked EbA to how people are impacting and using ecosystem services for their well-being and emphasising the importance of keeping ecosystems intact. However, there were also participants who felt as though EbA speaks to something new and alternative; that EbA is a new way of looking at environmental issues and challenges with a more holistic lens by incorporating aspects, such as climate risk, that were previously looked at in isolation. One participant saw EbA as a new way of understanding and responding to changes: *"EbA is about finding new ways of doing things that takes into account changing circumstances and using the environment that you got to help assist with those changes".* One participant, in particular, believed that humans have actively fragmented the natural system and spoke of our

responsibility to manage natural systems better and that EbA is one approach that offers a way to do this in a sustainable manner.

"*People have started fragmenting the natural systems and by doing that they are whittling the natural systems to help us to adapt to, or enhance our resilience to, CC. Ecosystem-based adaptation takes that into cognizance to say; We need to manage our systems better in a* ***sustainable*** *manner so that they remain* ***resilient*** *and if they are resilient then they help us to adapt to CC in turn"* (Participant 1).

For the three participants who had never heard of EbA, I gave a brief explanation, using the definition given in the "*Strategic Framework and Overall Implementation plan for EbA in South Africa"*. All three were very open to the use of EbA as an overall approach. Participant 2 said that it would definitely be supported in their sector and that there is an excellent potential for the kind of collaboration EbA requires.

3.2.2 Participants' Framing of EbA

A second step to unpacking EbA was to try to grasp how participants would frame and give meaning to EbA. Here I asked questions like "how would you describe EbA" or "what is EbA to you". Terms such as 'framework', 'umbrella term', 'guiding principle' or 'guiding tool' were frequently used as a way of framing and describing EbA. It seems, for many participants, that EbA is something overarching that would guide departments, people and communities in environmental projects. Table 3.4 below provides some of these framings.

Table 3.4: Participants' framing and description of EbA

Participant 3	"(For) me it is an **umbrella term** and I see EbA as bringing in a lot of smaller interventions and adaptations strategies that have been existing such as community-based and natural resource management and it is almost like a tick box exercises."
Participant 8	"My gut would be to say that it (EbA) is **guiding principles** but I think if you are going to use it in the context of responding to donor calls or anything like that then it is **framework**."
Participant 9	"I feel that EBA is rather a **guiding tool**. I have issues with terms like framework because then sometimes people interpret it like something that is hard and tangible. I think EBA is also about guiding or framing how you think. It is constantly evolving."
Participant 17	"I would think is it probably a **framework,** so I would like to think that it is more than just climate change and that you are looking at how the different conservation strategies fits into it a system that can better enable biodiversity and people to survive."

For some participants, the framing of EbA depended on the context. Personally, it could be a 'set of guiding principles', but formally it would be referred to as a 'framework'. Participant 9 had issues with EbA being portrayed as a 'framework' because EbA is more about how you think and approach a project. While others thought 'framework' was an appropriate way of framing EbA. Despite participants having different ways in which to frame EbA, majority of them saw EbA as a strategy or approach that brings together a variety of interventions and guides how different strategies come together to increase ecosystem resilience and protect human well-being from CC impacts.

3.2.3 Participants' Examples of EbA

The third step in unpacking EbA was to explore participants examples of EbA. Several participants related EbA to a variety of already on-going activities in the Western Cape. Examples of activities included (1) harvesting of honeybush tea; (2) farmers and landowners coming together on an agreement and plan for conserving ecosystems and biodiversity on their land; (3) the rehabilitation of sand dunes to act as a buffer for storm surge, sea-level rise and

sand build up; (4) clearing and removing alien vegetation; and (5) the use of ecological infrastructure[4] and green infrastructure[5].

Instead of providing details of all these examples, I chose one example that illustrates an EbA-type project according to one of my participants[6]. The project is currently on-going. Figure 3.1 shows how the study participant visually represented the project and Box 3.1 is how he described the project and its relationship to EbA. At first, he did not include CC in the illustration nor in the description, however when I asked if they had considered CC at all he eventually mentioned how the project could contribute to carbon sequestration and improved biodiversity.

[4] Ecological Infrastructure is defined as "the structural landscape network that is composed of the critical landscape elements and spatial patterns that are of strategic significance in preserving the integrity and identify of the natural and cultural landscapes and securing sustainable ecosystem services, protecting cultural heritages and recreational experiences" (Silva & Wheeler, 2017:33)

[5] Green Infrastructure is defined as "a strategically planned and managed network of natural lands, working landscapes, and other open spaces that conserves ecosystem values and functions and provides associated benefits to human populations, in order to link GI concept closely to its implementation" (Wang & Banzhaf, 2018:758-759)

[6] The participant participated in the Net-Map Toolbox exercise explained in Chapter Two (see section 2.3.2). The participant drew the picture and I redrew it in PowerPoint.

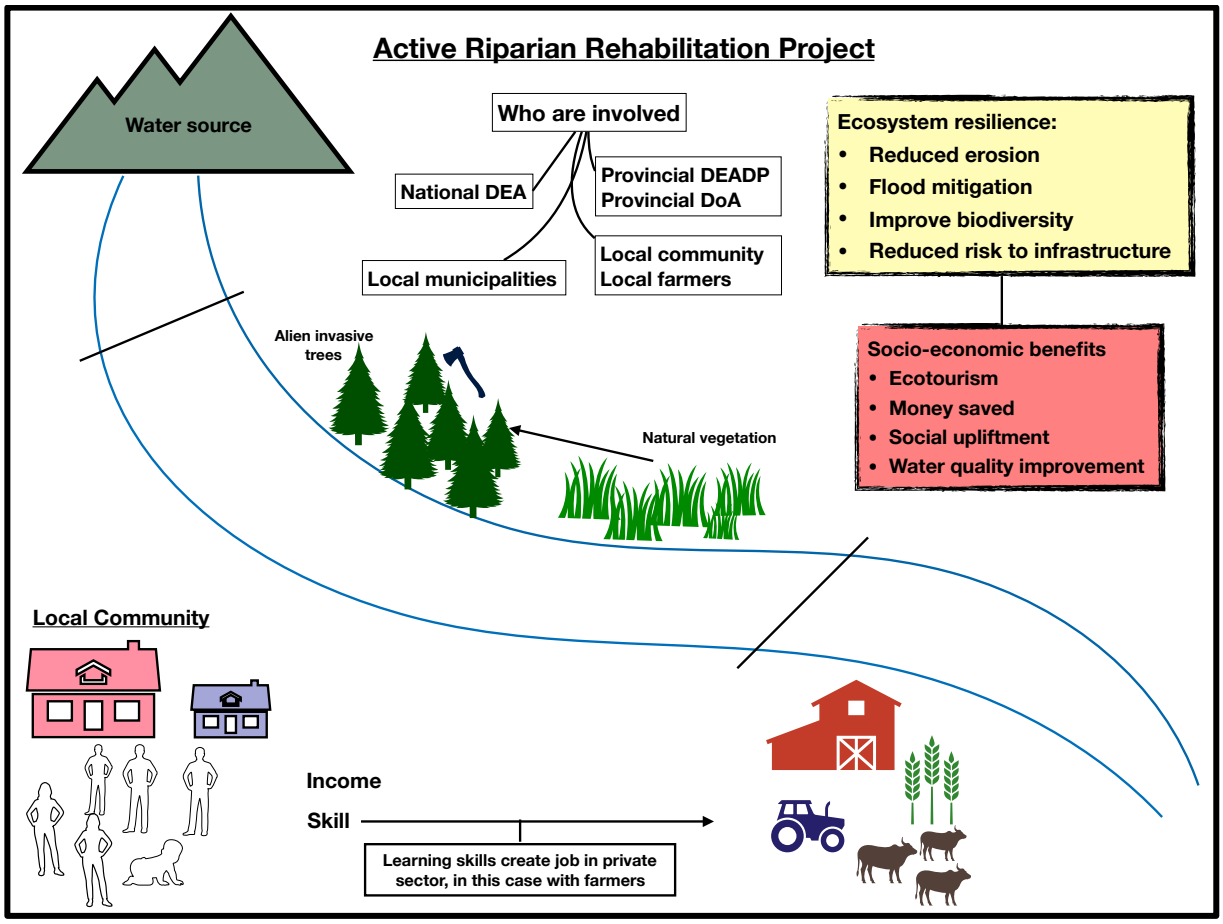

Figure 3.1: One participant visual example of an ongoing EbA project example taken from the NetMap tool-box exercise

Box 3.1: The same participants description of the project and how it can relate to EbA, also taken from the NetMap tool-box exercise

> This project focuses on increasing and shifting this area towards a greater functionality by clearing sites of alien invasive trees that prohibits the growth and function of natural vegetation. Though it is impossible to regain the pristine conditions of the area (what would be pre-colonialism), the projects aim to improve biodiversity by establishing natural pockets of natural vegetation, which can provide opportunities for succession in other areas (depending on seed dispersal). There are numbers stakeholders involved. In this case the farmers are important because they are the landowners and they need to be willing to participant and contribute to the project. The project is supported by National DEA and Provincial DEADP. DoA is also involved and plays a role as the link between the National DEA and local governments, community and farmers. Having DoA onboard on this project served to be important as this department have a good relationship with the local farmers. What the participant and his co-worker's believe they are doing is improving ecosystem resilience, which is beneficial to the farmer in terms of, for instance, ecotourism. The local community have been employed to do the work, they furthermore benefit in the sense that they receive an income and skills. In particular the skills can be further relevant to farmers or other entities in the private sector in the future. My participant thought of this as an EbA project, however the project is not labelled as EbA. He said, *"I suppose there is no push or drive need to call it EbA",* he also added that shifting the name of the project could potentially dilute the focus and interest.

A lot of the activities that were brought up as possible examples of EbA were, like the project above, primarily focused on socio-economic benefits and/or conservation of ecosystems and biodiversity. This shows that there are a lot of projects in the Western Cape that are similar to EbA, but lacking consideration to CC information and knowledge.

"We have been doing socio-economic and biodiversity that triangle for the last probably 8-9 years, so we are on top of that. The climate change scenario just has not come in" (Participant 19).

3.2.4 What is What? EbA in Relation to other Concepts

As a last part of unpacking EbA, I was curious to know how the study participants related EbA to other concepts such as NbS, green and ecological infrastructure. At conferences and

workshops, participants would ask “Why are we even talking about EbA?”, “What can EbA do for us?”, “Do we need EbA strategy?”. I often left these conferences and workshops feeling that there is a great deal of frustration and confusion around the concept of EbA. Similar attitudes were found in interviews as some participants felt EbA is being put forward as a “silver bullet”, while they themselves have been doing these kinds of EbA-like activities for a while without being recognized:

“(they are) trying to reinvent the wheel. Present it as something new, but actually it is sort of just the old kind of initiatives or existing, having a bit of a makeover. And for me that is problematic because its often shifts or dilute the focus and attention” (Participant 7).

“(it) is just a different name for what we are doing anyways, they are just adding climate change” (Participant 19).

Because of multiple on-going activities in the Western Cape, participants (in particular participant 5,6,7,17 and 19) expressed frustration over yet another concept being introduced. This again brings about challenges related to the overall understanding of EbA and how a lack of understanding is hindered due to several similar yet ultimately different concepts. Some of my participants used the term ‘buzz word’ for EbA and expressed the difficulty of distinguishing EbA from other related concepts. Table 3.5 below illustrates participant’s confusion, and at times, frustration regarding EbA and other related concepts.

Table 3.5: Participants' quotes on EbA and other related concepts

Participant 14	"It becomes very confusing and people just start talking about one thing and then it suddenly changes and then it is a new buzz word and you know as a non-academic I sometimes wonder what are the absolute subtle differences that make it something different."
Participant 7	"the buzz words… it would be very helpful if kind of, even within the EbA sector if there is such a thing, to say: Alright we are going to stick with this term or that term. This term is for that, this term is for that, and it is not this weird 'fuzziness' and 'blurriness' amongst these things and there is an agreement across sector that that is that."
Participant 3	"The first (challenge) is going to be the definition of EbA. I think it is so broad and a lot of people see it as an intervention whereas others see it as an umbrella term that has a number of different interventions that skirt across that continuum and it is very difficult to…try and understand … is it the right mitigation, is it the right adaptation or both?"
Participant 9	"The challenge would be the issue of diction, people saying the same thing but talking past each other because they don't understand what EbA is. I'm using nature-based solutions, so we are talking about the same thing."
Participant 15	"After having attended some conferences and working internationally and locally, there is, and this has been going on for some time now, the understanding of what EbA is (sic). Other people call it ecological infrastructure, ecosystem services… So just the nuts and bolts, the understanding from a political point of view, or another department's point of view, they generally do not get the grasp of the definition very well."

The quotes above express that participants feel like there are almost "too many" concepts, terms and approaches they have to engage with. Furthermore, frustration is amplified by the lack of orientation and training of these concepts, including EbA, which has led to participants talking past each other and potentially creating misunderstanding amongst one another. Some

participants would express EbA as being an umbrella term that has different levels and activities, while another would say EbA is a tool within the overarching concept of resilience:

"Ecosystem-based adaptation is suppose you can say is kind of like on a higher level and going a level down ecological infrastructure investment and then another level down it's kind of nature -based solutions kind of how they overlap with green infrastructure"
(Participant 7)

"the overarching concept is actually ***resilience****, and this is (EbA) one of its tools rather than EbA being the overarching"* (Participant 8).

One participant said that a potential source of this confusion regarding EbA has to do with the lack of continuity of concepts in the Western Cape government due to the fast-shifting priorities in the political spectrum:

"You are talking political cycles of five years and even in this next election (2019) we might not be DA govern anymore. So, we are writing strategies and things based on what the current government wants us to do, but in two months' time that might change completely. So, you cannot necessarily hang your hat again on the term because that might not be what the next party or the next Mayor wants" (Participant 3).

3.3 Discussion

3.3.1 Linking CC Understanding to EbA Understanding

It has been documented by researchers that public views on CC have evolved from being a 'creeping' or 'hidden' problem to a problem that is unfolding here and now (Moser & Dilling, 2007; Berrang-Ford et al., 2011). Signs of similar changes in how CC is viewed is also evident in the Western Cape. In a study by Pasquini and Cowling, they found that municipalities in the Western Cape were "still unsure of what climate change is" (2015:1131), however in my study participants perceived that there has been a growing awareness over recent years regarding the challenges of CC. My findings furthermore imply that CC has become more tangible due to various locally experienced disasters being linked to CC (Lorenzoni & Hulme, 2009). In particular, my participants mentioned the drought that hit Western Cape in 2015-2017, which, as mentioned in Chapter 1, was the worst drought since 1904 and unprecedented in terms of

water shortage (Botai et al., 2017; Hogesteeger et al., 2018). According to some participants, the drought was 'fantastic' for triggering awareness around the issues of water and CC, and therefore bringing concerns related to the impacts of CC to the table. Research shows that extreme events (like the Western Cape drought) have the potential to stimulate understanding on the complex relationship between CC science and public CC knowledge, and it can furthermore challenge the assumption that CC is a futuristic problem as well as the assumption of humans being isolated from the natural processes affected by CC (Adger et al., 2005; Lorenzoni & Hulme, 2009; Berrang-Ford et al., 2011).

The change in how CC is viewed and understood in the Western Cape has furthermore contributed to a heightened recognition of the need for adaptation responses, in particular, the importance of natural resources around water supply and conservation. Responses focusing on working with nature and using nature as an alternative and/or together with hard infrastructure have become popular and been broadcasted and accepted on a larger scale, both in South Africa and around the world (Vignola et al., 2009; Eggermont et al., 2015; Brink et al., 2016; Nesshöver et al., 2017; Aronson et al., 2019). However, though EbA is popular and incorporated into policies and strategies in South Africa, it is not consistently implemented (Reid et al., 2019.) One frequently raised reason for this is due to lack of evidence of EbA projects being effective (Reid et al., 2019; Doswald et al., 2014; Ojea, 2015). But my findings also suggest that it is related to how CC projections and other CC issues are integrated into mandates, projects and work plans.

In my case, there was a core group of people who had a well-integrated CC lens in their work, and these participants also had the greatest knowledge on EbA. Therefore, it could be argued that producing more general, but also tangible and concrete CC knowledge for each department will increase their understanding of CC impact and how these impacts might affect their work, communities and personal life. Spires (2015), drawing on Leary et al., (2008), indicates that first step towards responding to CC is to be able to perceive what CC means for oneself and society. Thereafter, it depends on these actors' access to CCA knowledge and their capacity to act. Often, CC responses are not being allocated the capacity needed to be successful. This is due to the responsibilities of reaching other development objectives such as reducing poverty and unemployment and CC responses can, therefore, be side-lined in terms of funding and human resources (Swanepoel & Sauka, 2019; Chevallier, 2012). Naturally, this limits an actor's capacity to act. However, research shows there exists a correlation between CC

responses and reaching other development objectives. Often responding to CC impacts can help address development objectives (Munang et al., 2013; Spires, 2015).

In addition to lack of CC knowledge and understanding, the findings show that participants are struggling to understand and distinguish how EbA operates from other approaches creating both confusion and frustration. One of the main reasons for this is because of the already on-going activities that are similar to EbA, making it hard for actors to distinguish between these and EbA.

3.3.2 Unpacking the Confusion and Frustration Related to EbA

When I asked participants about their understanding of EbA and how it relates to other similar concepts, I often felt they had a hard time figuring out how to start answering the question. Often, I would experience participants hesitating or starting a sentence only to stop half way through, as if there were many sides to the answer and they were unsure about which 'end' or angle of EbA they should start. The confusion over the concept of EbA and its relation to other nature-based approaches is expressed by the study participants and aligns with findings in the literature. In the literature, this issue is frequently raised (e.g., Doswald et al., 2014; Milman & Jagannathan, 2017; Nalau et al., 2018) and can be understood as a problem of 'conceptual fatigue' (Aronson et al., 2019). In the findings, participants expressed an inconsistency in how people refer to EbA and other approaches in the Western Cape due to lack of EbA understanding and the uncertainty of where in the spectrum of nature-based approaches EbA fits. This leads to conflated interpretations and a fatigued conceptual understanding of EbA (Aronson et al., 2019). The literature also shows signs of divergences regarding EbA's place in the nature-based approach spectrum.

Ecosystem-based adaptation is at times included under the 'umbrella' or framework of nature-based solution (NbS) (Cohen-Shacham et al., 2019; Reid et al., 2019). According to Cohen-Shachman et al., (2019) NbS emerged from the ecosystem approach which underpins the Convention of Biological Diversity and is defined as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" (Cohen-Shacham et al., 21:2019). However, in the "*Strategic Framework and Overall Implementation plan for EbA in South Africa"* by DEA and SANBI (2016), NbS is not mentioned. Ecosystem-

based adaptation is rather mentioned in relation to community-based adaptation, community-based natural resource management, and climate change integrated land use strategies (see figure 1.1 in chapter one) (DEA & SANBI, 2016). In a recent policy brief, EbA is considered a "nexus approach between NRM or nature-based approaches and climate change responses" (Aronson et al., 2019:2). Lack of consensus in the literature is reflected in the study participants responses. For example, one participant said that EbA is on a 'higher level' and going a level down we find ecological infrastructure and NbS. Another participant (see Participant 8 in table 3.4 and section 3.2.4) first explained EbA as an 'umbrella term' or 'framework' but would afterwards express that resilience is the overarching concept, and EbA is a tool.

The confusion that emerges from having multiple meanings and ideas attached to a concept is not limited to EbA. This has been encountered this in several fields; for example, stewardship (Cockburn, 2018; Enqvist et al., 2018) and environmental social work (Ramsay & Boddy, 2017). Vignola et al., (2013) speaks to the importance of sharing information that can identify the challenge(s) with concepts, such as EbA and stewardship. This can then promote common perceptions and understanding of what the issues are as well as increase the possibility to plan and respond to the challenge. As this section has suggested, one major challenge in mainstreaming EbA may be linked to the inconsistency and confusion regarding EbA. In a way, there seems to be "too many" varieties of similar approaches and a lack orientation and information sharing regarding these different approaches, which can bring about a reluctance to take on and mainstream EbA.

In the next section, I will to address this inconsistency and confusion by 'grounding' EbA. I will attempt this by bringing in my findings and comparing them with the literature on EbA. Doing so, will hopefully add more 'precision' to EbA and help 'ground' the concept.

3.3.3 How to Start to 'ground' EbA?

A significant hindrance to further mainstreaming and implementation is due to confusion associated with EbA, it is important to seek out the common features of EbA. The study participants' framing and example of EbA, indicates that EbA is understood as something that can 'guide' and 'frame' projects, rather than a strategy that has a list of things to tick off. Furthermore, participants see EbA as a strategy that brings in and combines different intervention and strategies from a variety of disciplines and sectors (see section 3.2.3). This

view overlaps with the literature. Ecosystem-based Adaptation is portrayed as a comprehensive and multifunctional strategy in the literature and is supposed to draw on several disciplines and build on cross-scale and sector collaboration (Vignola et al., 2009; Brink et al., 2016; DEA & SANBI, 2016). Ecosystem-based adaptation is furthermore recognized as a flexible strategy as it should and can adapt to local context to be successful (Vignola et al., 2013). Naturally, since EbA builds on several disciplines and should be adjustable to local context, there is a variety of activities that can fall under EbA depending on the context of implementation and the desired outcome. Because EbA can use a variety of activities in projects, it can often result in EbA projects not 'looking the same' across sites, which can bring about uncertainty of what EbA actually is.

Vignola et al. (2015) makes an example of this. In their paper on EbA for smallholder farmers, they make a new definition of EbA to have it align with what EbA means in an agricultural context:

"We define Ecosystem-based Adaptation in agricultural systems as agricultural management practices which use or take advantage of biodiversity or ecosystem services or processes (either at the plot, farm or landscape level) to help increase the ability of crops or livestock to adapt to climate change and variability." (Vignola et al., 128:2015)

Following on, they provide several examples of activities in EbA projects that seemingly look different to each other. On a farm-level, EbA activities can include diversification of crops to ensure a broader source of crop resistance-capacity in terms of extreme weather events; on a landscape-level using biodiversity and ecological processes can help to regulate water and nutrient cycles (Vignola et al., 2015). In the wider literature, EbA activities can include sustainable harvesting of seagrass or mangroves in marine areas (Ahammad et al., 2013; Sierra-Correa & Cantera Kintz, 2015). Moreover, on terrestrial areas, activities presented by the participants of this study was honeybush tea harvesting and rehabilitation of sand dunes to mention a few. Despite these activities being very different from one another, these projects should essentially build on what Vignola et al., (2015) calls the three dimensions[7]. Every EbA project should strive to 1) *conserve and maintain ecosystems and biodiversity* while at the same

[7] These three dimensions are what this thesis refers to as the three spheres: Socio-economic benefits, conserving ecosystems and biodiversity and climate change adaptation

time draw linkages to and provide for 2) *socio-economic benefits* and lastly, projects need to address 3) *CC impacts* (DEA & SANBI, 2016). The three dimensions or spheres can serve the purpose of being the 'structure' or 'boundaries' of EbA. These three spheres can, moreover, allow for a common identity of EbA to be established and recognizable across site and scale. This way, EbA projects are opening up and allowing appropriate but sometimes significantly different activities to take place within the structure of these three spheres or dimensions, while remaining recognizable for actors outside of the project(s).

3.3.4 Distinguishing EbA from other Approaches

Many participants asked, if the Western Cape is already doing activities that can be viewed as EbA (often lacking a CC lens), why then is it so important to introduce EbA? The combination of the three spheres, especially the integration of CC, is what makes EbA stand out from other approaches (Vignola et al., 2015; DEA & SANBI, 2016; GIZ, 2017). Throughout the country, South Africa has implemented several CCA approaches as well as several NRM approaches. Often depending on the approach, projects tend to focus on two out of the three spheres of EbA. Many of the CCA approaches, such as community-based adaptation, operate with limited consideration to ecosystems and biodiversity (Chishakwe et al., 2012). While on the other hand, NRM such as community-based natural resource management emphasises the use and management of natural resources often without deliberate attention to CC science and projections (Aronson et al., 2019). EbA offers to unify the two strands of approaches by building on the three spheres instead of two, in particular, the incorporation of CC science, projections and impacts.

As many projects in the Western Cape already do focus on conserving ecosystems and biodiversity and at the same time providing socio-economic benefits, there exist a huge scope for projects to possibly become even more robust and durable if CC impacts are considered (Aronson et al., 2019). There is no doubt that CC will impact both the economy, nature and society negatively. Droughts, flood, storm surges, inconsistent rainfall patterns, sea-level rise and a warmer planet will cost human and animal lives and also result in significant economic losses for many countries and regions (Reid, 2011). For ecosystems and biodiversity, the same events as mentioned above, will disturb natural processes and will result in a mass extinction of plants and species around the world (IPBES, 2019). Incorporating CC science and projections into planning can help make projects and the outcome of projects more 'forward

looking' and assist actors to choose appropriate activities to ensure successful and sustainable outcomes (Chishakwe et al., 2012; Aronson et al., 2019). Adding enough consideration to CC projections and their impacts on different parts of the ecosystems, and consequently, people was one of the primary challenges for study participants.

Many of the examples of EbA given by the participants were of already on-going activities in the Western Cape. The majority of these examples did, however, lack the integration and the effects of CC on society, ecosystems and projects. As shown in the result section (see section 3.1.2) of this chapter, some participants found it challenging to integrate CC science into their work due to CC being communicated with generic language. They also find it hard to relate to the facts of CC and some saw CC as something that did not pertain to them and their workspace. Again, as argued above (section 3.3.1), improving government officials understanding of CC and its impacts across sectors and how to engage and work with CC projections might be necessary in terms of mainstreaming and the implementation of EbA in the Western Cape.

3.4 Conclusion

The findings from this chapter suggest that participants understanding of EbA relates to their understanding and knowledge of CC. Lack of knowledge and understanding of CC impacts and how these impacts may affect their work, can impede the uptake of EbA in the Western Cape. Therefore, it is imperative to increase departments understanding of CC to enable better mainstreaming of EbA. Furthermore, the specific EbA findings show that EbA is being understood and conceptualized in the Western Cape as something that can 'guide' a CC orientated project, by being a framework, 'umbrella' or a 'set of guiding principle' for projects in the Western Cape.

Ways in which EbA plays out in reality is highly dependent on the context (Vignola et al., 2015). Potentially, in one case there may be a greater focus on conserving a particular section of an ecosystem (because of the information received from CC research) and less focus on socio-economic benefits. Or, in another case, there may be a focus on how CC may affect the socio-economic development of a particular place and protecting and conserving ecosystems and using this as an adaptive mechanism. This leads to an EbA project having a variety of activities to choose, making projects looking vastly different from one another. However, whichever activities EbA projects chose to carry out, it is crucial for EbA projects to have

multiple activities play within the ‘structure’ or ‘boundary’ of the EbA projects, so as to cover the three spheres of this approach. These three spheres can be understood as EbA’s collective identity making it easier for actors across the Western Cape, South Africa and in other countries to recognize EbA, and furthermore assist them to carry out EbA projects themselves. In this way, EbA is not limited to a set of activities, but rather aims to open-up for a mixture of new, old and alternative activities that include both scientific and traditional knowledge that can better match the context of implementation (Reid et al., 2019).

Chapter Four: Factors Influencing EbA Mainstreaming and Implementation

4. Introduction:

This chapter explicitly addresses Objective 4 and aims to explore the challenges participants have experienced or foresee they will experience in mainstreaming and implementing of EbA, and as well as possible enablers that may help overcome these challenges. The challenges and enablers I will present in the chapter are not exclusive to EbA. All of them are mentioned in the broader literature on CCA and nature-based approaches (e.g. Munroe et al., 2012; Spires et al., 2014; Nalau et al., 2018). This suggests that some of the challenges the Western Cape is facing in implementing and mainstreaming EbA go beyond the specific issues of EbA as a concept and approach and is linked to broader challenges in government. Before I start elaborating on this in the discussion, I will first present the findings regarding challenges and after that enablers.

4.1 Challenges

The previous chapter dealt with unpacking EbA in the Western Cape. Some of the findings showed that one of the main issues with regards to EbA in the Western Cape is linked to a lack of understanding of EbA and the difficulties in distinguishing EbA from other nature-based approaches. As the lack of a comprehensive understanding of EbA may be a challenge for implementation, EbA, like many other CCA approaches and nature-based approaches such as CBA, NbS and stewardship, encounter several institutional and governmental challenges. I will speak of these challenges under three different sub-headings. The first is related to funding and the funding mechanisms, the second speaks to how government silos are prohibiting good collaboration, and lastly, participants raised the complex issue of short-term and long-term objectives and planning cycles.

4.1.1 Funding Mechanisms

The issue of access to financial resources was raised in two different ways by participants. Either as scarcity or a lack of funding, or as an issue with channelling the funding correctly and efficiently. Table 4.1 below shows how participants working in CCT municipality, CapeNature and SANParks see funding as a scarcity.

Table 4.1: Participants' view on challenges related to funding

Participant 13	"The standard answers (to question of challenges) is always **resources and funding**, if you had infinite amount of money you could do anything, you could adapt perfectly if we have infinite amount of resources, you never do in local government and sometimes we are worse off than others"
Participant 18	"We really need to have some of these programs working at scale to have enough impact. And with scale immediately comes the **question of funding**. You got a big project; you need funding, so that is a challenge"
Participant 18	"The **funding cycles** are big hang up, some you will find maximum for the term of local elections and when the new batch of councillors comes in they might have a new set of priorities and they vote, no we are not going to spend money on conserving and no money gets set aside for it"

Participants from local government expressed concern over financial funding and human capacity when it comes to mainstreaming and upscaling EbA. Interestingly, challenges articulated by participants from provincial and national government were rarely about funding and finance. If discussed at all, these participants did not see the issue as a resource scarcity, but rather about how the money was being channelled and the process of receiving the money. Quotes below are by participants working at the provincial level:

"I don't think financing is a real challenge. It could be a limiting factor, but I don't think it's a challenge. The finance is there, but it is where it is being channelled" (Participant 9).

"Funding, I don't think is a barrier in SA… OK, it doesn't come on time and all that" (Participant 5).

This contradiction between levels of government is very interesting, and sometimes there were different views even within the same department and organisations, for example, DEADP and CCT Department of Environmental Management, or CapeNature. As I started investigating deeper, I found that the challenges with funding are two-fold. On the one hand, participants from local and government organisations are finding that they actually lack funding. On the

other hand, this is also related to the bureaucracy of gaining access to funding, which includes heavy paperwork and reporting which is seen as a very time-consuming process, especially for those who are considered to be the implementors of policies and strategies.

"You cannot do anything without having to write reports. Everything got to be tick boxed (sic). We have to commit, we have our park management plans so everything filters down under strategic objectives and you got to report under strategic objectives, and they always want a number attached to that strategic objectives" (Participant 17).

The same participant also expressed that even using the money they have been allocated can sometimes be troublesome. The concern for corruption and misuse of money has created an intense system of financial reporting and auditing:

"We are also constrained in how we can spend our money, so you got to plan your budget every year and you are not guaranteed to get the money you have applied for, you will find out a couple of months later what you got and then every time you want to spend money you got, you got to get your quotes and intended processes which takes like months and often you lose track of what the work was" (Participant 17).

For example, in one of SANParks reserves, the workers found the engines on the boats used on a day to day basis to have high levels of pollution output. The workers requested to swap out the engines with more environmentally friendly engines, and they were required to get quotes and document the reasons for the new engines. This then needed to be approved by several actors higher up. When they eventually did receive the engines, it turned out to be the same engines they already had in place. My participant did not blame anybody, but instead said the process is so long that goal often get lost along the way:

"It is a real problem of the functioning of the day to day activities, like you cannot just buy stuff. You see something is broken you want to do the right thing and replace it, and you can't. Government is under huge pressure to avoid corruption they have implemented more and more laws that actually in the end makes it impossible for you to do anything, if anything it actually encouraging you to find way to avoid the rules because they are just so un-workable" (Participant 17).

In fact, because the system is so strict, participants found that going outside of these government structures is a better way of getting things done. Examples of this are using other funding channels: *"So, we actually have a registered climate change program now, where we apply for funding. But you apply under a different organization name so they can get the money and actually spend it"* (Participant 17).

4.1.2 Challenges with Government Silos

A point of frustration for the participants was due to the lack of collaboration within the Western Cape government. Participants who have been working on the ground to implement projects see the importance of collaboration between multiple departments, government organisations and NGOs, however, these participants have experienced how difficult it can be to collaborate across sectors due to the so-called 'silo effect':

"Climate change is one silo, economics is one silo and ecosystems are one silo" (Participant 19).

"Silos are historical, they are completely inherent in almost every organizations. You always have departments working independently of another and what we are trying to do is to break that down. In any EbA project the success will be in partnership" (Participant 3).

These historical silos are reinforced by government officials mandates and job description. Many participants expressed that they felt quite bounded to these mandates and found it hard to be flexible and to collaborate outside of their mandate. Despite the fact that collaborating across mandates might be more effective and efficient:

"You must understand that we are officials, as departments we have mandates, we have documents that we follow. That's predominantly why we come in every day – we want to deliver these particular services." (Participant 11).

"We do not have mandate to work outside of our protected areas and that is where I really struggle. And one of things with a lot of the parks is that they are not at the source of a river system. So, you are receiving a lot of mess, and then you have to work with people upstream, but you cannot make people to do stuff" (Participant 17).

I became curious as to why they had such strict mandates, and asked participants why they thought this was the case. Some participants would speculate if it is related to the rather hierarchical and bureaucratic government structure in South Africa. Participant 5 suspected that higher-level officials (e.g. National Government) have a hard time trusting lower-level officials (provincial and local government) to make the right decisions on the ground.

"It could be a fear of senior management not being in control of strategic talks going forward and having to work with bigger groups. What are you saying on behalf of this department to those other departments? How much of your time has been taken by other departments to help them get their work done…Those types of fears, you know" (Participant 5).

This participant related it to a 'fear' of sharing responsibility and control. Another participant said that if strategies and policies do not come from your department, you were more likely not going to put in the effort to implement them. Therefore, it might be essential to build these strategies, like EbA, from the bottom-up.

"I think there are a lot of rules and there are these silos. And it is very difficult to put an umbrella thing, like ideally you want your strategy to govern all of those things, and if it does not come from within your department you are much less likely to want to implement it. So, it gets really tricky and you kind of need to form it from the bottom" (Participant 17).

4.1.3 Challenges with Short Term versus Long Term Objectives

The last challenge raised by participants was the general emphasis that the South African government has on short-term objectives and decision making, and the lack of long-term thinking and planning. Table 4.2 provide participants explanations of the dominance of short-term thinking in government may affect long-term approaches like EbA.

Table 4.2: Participants' answers to how and why short-term thinking can be a challenge for EbA.

Participant 18	"We are stuck with a very short-term, it is the political regime we are in and the high level of need and poverty gives people the 'I want everything now and yesterday' and they don't think about long term"
Participant 18	"Sometimes the continuity is very important. Alien clearance is great case of point; if your funding's goes up and suddenly drops, the aliens bounce back and suddenly you are back to square one again. So, all of that investment that you made is now wasted"
Participant 8	"One of the big things we are very concerned about is money for implementation but not for maintenance and operation"
Participant 7	"Short term vs long term because if you are dealing with anything of the natural environment there is no quick fix, if you are operating on a broader scale it does require long term planning, long term revision and approaches"

Participants expressed how the reality of other pressing issues and emergencies, such as housing and education can suspend long-term objectives. However, as another participant mentioned, working with nature (for instance ecological rehabilitation) is a slow and gradual process which requires long term commitment. The quotes furthermore show that there are multiple sides to short-term versus long-term thinking and that perhaps it is important for long-term strategies and objectives to focus on addressing the short-term emergencies along the way to ensure enough support.

4.2 Enablers

From the interviews, three enablers were identified. The first was having one or a couple of actors that are dedicated to the project, often these actors were called "champions". Secondly, providing tangible and relatable evidence and demonstration is an efficient way to increase the uptake of EbA. Thirdly, using applicable language when introducing and communicating EbA information.

4.2.1 Champions

One of the most prominent findings regarding enablers was the need for champion(s) to drive and keep commitment to a project. Champions was almost seen as essential in projects as these actors have the ability to encourage cross-departmental collaboration, pull stakeholders together and facilitate for different actors' interests in projects:

"(what is) very important is to identify a local champion or someone who will run from a point of passion. It is a bonus if the person has vision as well and knows what is happening through the different tiers of government" (Participant 9).

"We got champions that are very keen and invested and that makes a difference and I think if you got those kinds of people and you can do things and demonstrate the change" (Participant 14).

However, not just anybody can become a champion. One participant explained how certain personal qualities and how the person is viewed by others is important. For instance, being open-minded, having time for and being open to actors' perspectives and views are considered essential traits. From the outside, a champion need to be trusted and reputable. Participant 16 says: *"The tricky thing is, whoever the driver is (champion) also needs to have a certain amount of power or the ability to be recognized. And (to have) convening power or they need to be highly reputable"* (Participant 16).

Interestingly, in terms of EbA mainstreaming and implementation champions do not necessarily have to come from the DEADP or have a background in environmental change and challenges. In fact, finding actors outside of the environmental department can potentially create a greater buy-in and interest in EbA. Participant 10 speculates that officials might be more open to foreign and novel concepts, like EbA, if presented by somebody outside of environment department:

"There are actually quite a lot of people within those engineering functions that are more and more onboard with that (EbA). There are definitely champions within that (engineering) department with that message. Which is great, because it is one thing to have the environmental department on the outside telling everybody you must do it this way and they maybe don't want

to listen. But when you got somebody inside (your own) department saying we need to change the way we do it… that's much more powerful" (Participant 10).

Identifying champions from a variety of sectors that can present and push EbA forward might be an important enabler for the Western Cape government.

4.2.2 Providing Tangible Evidence and Demonstrations

A second enabler raised by participants is the importance of demonstration of EbA. Demonstrating "how to do" EbA in different contexts can make government officials more confident in the EbA approach being cost-effective and providing additional benefits, as well as increase the interest for EbA. Since there already are many on-going environmental projects in the Western Cape, a way forward, according to some participants, would be to start identifying and take lessons from these projects. Table 4.3 below shows participants comments on EbA demonstration.

Table 4.3: Participants' view on how EbA demonstration as an enabler.

Participant 1	"Labelling these (projects) as EbA projects helps us, as government, to identify the projects that actually demonstrate that this concept is working"
Participant 18	"I think it is quite important that people identify projects that do implement EbA rather than talking about EbA the whole time"
Participant 14	"If we can build some of these demonstration projects then I think it (EbA) will be taken more on board"

Since demonstrating EbA was an important enabler for participants, I became curious as to who would need this demonstration? It seems as though there is a need to demonstrate how EbA can work for different sectors, in particular outside of the environmental sector. Basically, what is needed is to demonstrate how EbA can work for Recreation and Parks Development as well as for the Department of Human Settlement and, furthermore, provide examples and evidence of how EbA can contribute to more than just improve ecosystems resilience. Participant 14 and participants 13 explains:

"...you know human settlements (for instance). The other day we were talking, and you are building a new settlement, or you are re-blocking settlement, why can't you make provision to plant a tree? And you know, in the Cape Flats why are there not mechanisms where that just becomes part of the projects? Because you know, maybe it is a fruit tree because it is going provide a little shade plus some nutrients, some security in food (...) You look at a lot of the different public spaces and it is just grey plots, you know it could be better, to be put out as community food garden. You can still use it, but it is providing a functional purpose. So, I think there is a lot of opportunities to do things different. And it comes down to time and buying people in and to start change people's mindset about it."

"And if we could make it work, and we can demonstrate that it is working for people, not just nature. That is very important for decision-makers" (Participant 13).

4.2.3 Communication and the Use of Appropriate Language

The last enabler raised in this result section can be understood as a challenge as well as an enabler. Participants mentioned lack of good communication as a problem when presenting and translating new concepts such as EbA. Therefore, an enabler would be to use appropriate language to effectively translate EbA information. By improving communication, EbA can gain more support and interest. However, what constitutes good communication? Participant 7 below highlights this particular challenge:

"How do you effectively communicate what it is we are doing here and are able to achieve without people falling asleep or losing interest. Those kinds of key communication strategies I think are very important. Because there is a lot of good things happening within the government space (...), but we don't effectively communicate, articulate and present it" (Participant 7).

According to some participants using familiar language when presenting and articulating EbA across governmental levels and between science and policy can perhaps make the communication of EbA knowledge and information more effective. Below is participant 16's opinion on this matter:

"You will always have the guys at national understanding EbA, but a lot of the time, my opinion is that where the rubber hits the road is with local government. And if you're talking to

municipal-officials you have to think of what they are familiar with, and what their core requirements and mandate are, and once you can speak to them in their language, understand and translate to context tangible for them; then you get a lot more momentum around them" (Participant 16).

Other participants put emphasis on the choice of words when presenting EbA. For some participants the use of scientific terminology and academic words can potentially cause certain actors that are not familiar with EbA to shy away. For instance, if presenting EbA to engineers, using words that these actors are comfortable with can be a powerful tool for the uptake. Box 4.1 shows a dialogue between me and participant 8 regarding how to choose and use applicable language.

Box 4.1: Dialog between researcher and participant 8 on the use of applicable language and words.

Participant 8: "*Because of the fact that we have been using it (EbA) in terms that engineers and economist are comfortable with. I think what resonates better with the built environment sector is green infrastructure because it still has that infrastructure sensibility to it."*

Researcher: *"You could, for instance, get more "buy-in" if you say green infrastructure or ecological infrastructure? Infrastructure is easier than saying EbA?"*

Participant 8: "*Yes"*

Participants also drew on the importance of presenting EbA in a manner that can appeal to the different stakeholders. Examples of this can be to put more emphasis on the financial benefits of choosing versus not choosing EbA, provide cost-benefit analysis or communicate how EbA can contribute to improved livelihood. Table 4.4 provides some insight from participants on this matter.

Table 4.4: Participants' thoughts on how to communicate EbA information to different actors.

Participant 3	"I think ultimately it is about making it relative to department. So, what the long-term implications of not doing anything? Is going to cost? and there are a number of examples from countries and all over the world that it has been proven very successful"
Participant 10	"There has been a lot of recognition that looking at green infrastructure and ecosystem-based approach can be a lot cheaper than a traditional engineering approach. Artificial wetlands instead of concrete storm to drainage system can be much cheaper and effective. It also has benefit for biodiversity for aquatic life, so I think that is something that is still unusual for engineers. There is starting to be more recognition in those professions that the greener option can be money saving, can be less maintenance and easier to implement and more flexibly"
Participant 8	"Cost-benefit analysis is actually what we have been focusing on, even though it is not our natural space. We found that unless we put it in those terms when we talk to other sectors, they are not taking it as seriously. So, that is why we have been trying to put numbers and technical criteria to things so that we can actually say, 'This is why you should invest your money and even though you have to maintain and operate it, it is still going to be cheaper than if you put a manmade solution that ignores all of those factors' "

Lastly, the use of champions or neutral partners such as NGO's was raised as an enabler for communicating and presenting EbA. In some way, champions and NGO can act as a middleman between the department and tiers of government, due to their ability to objective:

"Certainly, working with our water colleagues, we got champions that are very keen and invested and that makes a difference and I think if you got those kinds of people and you can do things and demonstrate the change" (Participant 14).

"There needs to be constant communication between the different tiers. NGOs, because of their objectivity they are quite neutral. They are able to influence implementation at a different level" (Participant 9).

4.3 Discussion

There are several ways in which to understand why these challenges presented in the result section exists. Some of these challenges are influenced by South Africa's history as well as the global community and powerful global organisations such as the UN and World Bank (Bek et al., 2004). It is also possible to relate these challenges to legal and constitutional barriers that can influence the implementation of EbA (Taylor et al., 2014). However, this discussion will primarily focus on what these challenges mean for EbA implementation and how the identified enablers can help support EbA implementation and mainstreaming.

4.3.1 Challenges

Besides for the conceptual challenge and confusion related to EbA (see Chapter 3), none of the challenges raised in this chapter are, as mentioned above, exclusive to EbA nor to Western Cape and South Africa (Davide & Walker, 2013). For example, a policy brief of CCA implementation in Asia shows several of the same challenges; lack of coordination and collaboration in government; gap between knowledge producer and user; and the lack of institutional arrangements to support local government to carry out CCA (Davide & Walker, 2013). The investigation of the different challenges in the literature shows that all of the challenges raised, feed into one another making it hard to find a way forward and without targeting all of these simultaneously (Duff & Masters, 2012). Addressing the challenges in practice one by one is, therefore, not productive as CCA approaches like EbA are complex and multidimensional (Duff & Masters, 2012). For example, providing better access for funding for local government in the Western Cape, but not improving collaboration across departments is not enough for EbA to succeed. The need to address the challenges as a 'whole' and as a product of an entire government system is vital for implementation of EbA. However, in terms of discussing my findings in a somewhat comprehensible manner, I will continue with the same categorisation made in the result section.

4.3.1.1 Funding

Instead of investigating if there is or is not funding for EbA implementation, I found it more important to investigate why participants find the funding mechanisms problematic. Participants spoke about funding cycles as a 'big hang up', and that funding is the biggest issue in particular for local government and government organisations. Participant 17 gave a

thorough explanation of the process of applying, accessing and spending money, and how sometimes going outside government channels is more rewarding (section 4.1.1). In the literature, we find Spires (2015) identified similar barriers which she categorizes as organisational and discursive barriers. She speaks of a highly structured procurement systems government officials have to navigate in order to gain access to funding, technological support and human capacity (Spires, 2015). The procurement systems in South Africa is highly complicated and comprised of several pieces of legislations, policies and regulations in order to avoid corruption and misuse of resources. It, furthermore, aims to build on principles of fairness, equity, transparency and cost-effectiveness. One piece of legislation is the Municipality System Act which was set in place to enable municipalities in South Africa to provide services depending on their service delivery agreements, including their mandate and strategic objectives (Bolton, 2008). Government officials in local government can, therefore, be essential facilitators in terms of providing resources and creating opportunities for EbA (Ziervogel et al., 2016). However, this is only accessible if EbA is incorporated into their mandate, the departments' strategic objectives and in the Integrated Development Plans program for municipalities.

Findings furthermore imply that due to procurement system being very structural and stringent, it makes the process of applying and receiving resources very time-consuming. This can have negative implication on the day to day function for government organisations and departments and result in officials failing to recall the purpose of the application in the first place (see Participant 17, section 4.1.1). The system also tends to value price over functionality which can ultimately hinder access to specific skill sets and technology needed for successful implementation (Spires, 2015). This shows that there exists a disconnect between those in control of granting resources and those applying and using resources (Davide & Walker, 2013). Despite EbA being advocated as cost-effective strategy that can provide several benefits that might overall save money long-term (Reid et al., 2019), the evaluation of CCA approaches, like EbA, is generally based on the monetary cost of implementation while the benefits of CCA approaches is usually shown in non-monetary value, typically as avoidances (Chevallier, 2012). This is partly due to the difficulty of measuring the monetary value of well-functioning ecosystems and the costs of ecosystems losing its function (Chambwera et al., 2014). Therefore, it can appear that the cost of implementation is higher than the overall beneficial outcomes. Essentially, full benefits of EbA are difficult to quantify in monetary value which can result in other interventions like hard structural solutions being prioritized.

4.3.1.2 Silo Mentality

Lack of coordination and collaboration in government is also a common challenge in CCA (Davide & Walker, 2013; Pasquini et al., 2015). This is also mentioned as institutional 'silos' (Pasquini et al., 2015) and as the lack of leadership that can stimulate organisational culture of innovation and collaboration (Burch, 2010). Similar, to the literature, the study participants brought up the challenges of government departments working in 'silos'. Institutional 'silos' are a metaphor used to describe a lack of cross-departmental communication and collaboration. In South Africa, institutional silos are a historical problem that fails to facilitate collaboration amongst department and individuals (Pasquini et al., 2015).

In the findings, participants mentioned that their mandate and strategic objectives did not always allow for collaboration with other departments and sectors, even if it would improve the overall situation of a location. An example of this can be a river running through a national park. SANParks would have the mandate to rehabilitate, remove alien invasive vegetation and keep the river clean inside their area but not outside of the park's legal boundary. Even if SANParks had local communities and different government departments involved with working on the river they are not always allowed to share their resources outside of the park. This challenge is very problematic for implementation of EbA projects in the Western Cape, as EbA projects relies on collaboration across a departments, sectors and communities to prosper (Ojea, 2015; Pasquini & Cowling, 2015; Wamsler & Pauleit, 2016; Ziervogel et al., 2016; Milman & Jagannathan, 2017).

4.3.1.3 Short-Term and Long-Term View and Responses

Many CCA responses are triggered by events, such as fires or drought, and can, therefore, be seen as reactive measures (Adger et al., 2005). Human and financial resources are then quickly allocated for implementation of immediate solutions, but rarely for maintenance and operation. For approaches like EbA that aims to work with nature, as well as adapt to long-term climate threats, establishing long-term objectives and planning is essential (Reid et al., 2019). However, more often than not, short-term benefits and tangible issues are more emphasised than long-term risks and threats (Noble et al., 2014; Reid et al., 2019). This is partially due to the generalised short-term decision making processes in government, but also to the difficulties of engaging with long-term climate information (Noble et al., 2014). The uncertainty in CC

sciences results in rapid changes and new findings in research revealing new problems and solutions which can be challenging for government officials to keep up with and respond to (Pidgeon & Fischhoff, 2011).

Moreover, since the Western Cape struggles with high levels of unemployment and poverty, some of the participants mentioned the challenge of implementing long-term approaches when the province is faced with many other pressing issues. Often projects like EbA are side-lined due to other socio-economic issues. This is linked to CCA approaches not being mainstreamed enough into other development activities, resulting in CCA and development activities, acting as antagonistic rather than being compatible (Chevallier, 2012). Therefore, it is important to align and demonstrate evidence of EbA's ability to contribute towards broader set of development objectives. Furthermore, since collaboration is required for EbA, time is needed to cultivate good relationships and trust with the various actors involved in a project (e.g. local community, scientists, governmental departments and organisations) (Chevallier, 2012; Spires, 2015; Ziervogel et al., 2016).

4.3.2 Enablers

4.3.2.1 Effective Demonstration and Tangible Evidence

Successful demonstrations of adaptation strategies are proven important in order to gain interest and access to funding, this is also the case for EbA (Chong, 2014; Nalau et al., 2018). Several researches have battled with how to quantify the value of EbA outcomes, especially in term of how mitigation and adaptation can be achieved through restoring ecosystems, and how these projects can result in social upliftment (Munroe et al., 2012; Roberts et al., 2012; Newsham et al., 2018). The lack of proper demonstration and evidence of EbA benefits has been known as a constraint for EbA implementation since 2012 (Munroe et al., 2012; Roberts et al., 2012; Chong, 2014), and working towards providing more evidence for EbA has been an important factor to enable broader mainstreaming of the concept.

For participants in this study, the lack of evidence and demonstration of EbA is in part the source for many of the challenges they presented. In terms of accessing funding, providing evidence that EbA is a societal and cost-effective adaptation strategy can be a motivating factor for funders, donors, and politicians, and result in greater buy-in from a variety of sectors (Spires, 2015; Nalau et al., 2018). Good demonstration of EbA would involve collaboration,

communication and shared responsibility across government sectors, scale and level. This can build evidence against working in 'silos' and provide solutions on how actors can to work together (Cockburn, 2018). Furthermore, evidence and demonstration of EbA would also show that long-term planning can address and potentially mitigate short-term emergencies along the way.

One reason for lack of demonstration and evidence of EbA is due to the novelty of the approach compared to other related approaches, and as a result EbA is not yet capable of demonstrating outcomes and successes (Chong, 2014; Reid, 2016; Nalau et al., 2018). However, since there already are multiple on-going and similar projects in the Western Cape, a way forward would be to consolidate the lessons and pieces of evidence from these projects to inform EbA (Reid, 2011; Nalau et al., 2018). Building on existing knowledge and research, and comparing studies from Western Cape, as well as lessons from other areas, can provide information on costs, challenges, opportunities and advise EbA implementation and mainstreaming (Munroe et al., 2012; Nalau et al., 2018).

4.3.2.2 Good Communication and the Use of Applicable Language

Evidence and demonstration of EbA is essential for implementation of EbA. However, the literature and the study participants also emphasises the importance of using appropriate language when communicating and demonstrating EbA (Spires, 2015). For demonstration to be *effective* and *tangible*, the information needs to be accessible to practitioners (Davide & Walker, 2013). Climate change science and research, as mentioned in Chapter 3, can sometimes be too generic and broad for government officials working on the ground, making it hard for them to engage with the information presented. One participant said it is important to be familiar with core requirements and mandates, understand day to day practices, and use similar language and terminology when providing information on EbA. Participant 8 gave the example of using words like infrastructure and using cost-benefit analysis when translating EbA information.

Choice of words can impact how well the information is received, for instance, the use of fear, stress and emergency might be more overwhelming and paralyzing than productive (Spires, 2015). Establishing conversations across department and sectors that opens up for sharing and co-construction of knowledge is important for the uptake of CCA projects and

also EbA (Ziervogel et al., 2016). Academics, researchers and policy makers are also responsible for enabling these conversations, as knowledge producers it is important to tailor the information based on the user's ability to act on it (Mukheibir et al., 2013; Geneletti & Zardo, 2016). For instance, a 'producer' of EbA knowledge might expect greater flexibility and ability to plan within the parameters of CC uncertainty than the 'user' actually have, resulting in two different operational realities (Mukheibir et al., 2013). Therefore, it is crucial to find ways to deliver the message of EbA that aligns with government official's mandate, strategic objectives and day to day practices.

4.3.2.3 Champions

The importance of champions is highlighted in the literature and by participants. Champions are essential actors in implementation of CCA strategies (Spires, 2015) and some researchers say without local champions CC would not have been on the South African government's agenda (Taylor et al., 2014). They are seen as passionate actors that can 'kick off' projects and keep the drive and commitment up (Ziervogel et al., 2017; GIZ, 2018; Swanepoel & Sauka, 2019). It is, therefore, recommended to identify champions within the different government sectors. Furthermore, champions can help improve collaboration, strengthen networks and social processes, elevate EbA to the agenda, support implementation and possibly assist in upscaling of EbA projects (Duff & Masters, 2012; Taylor et al., 2014; Spires, 2015; Ziervogel et al., 2016; Reid et al., 2019).

A champion is also described as somebody who has the courage and confidence to translate knowledge from theory to practice, who is humble enough to recognize limiting factors as well as having 'convening' power (Taylor et al., 2014; Ziervogel et al., 2016). These personal skills are often more important than having good basic knowledge on EbA, according to some participants. Champions can be seen as the connection between the different tiers of government as well as to local community (Reid et al., 2019), they can also assist in formulating evidence and demonstrating EbA benefits in ways that are understandable to future EbA practitioners.

4.4 Conclusion

This chapter focused on the factors influencing EbA mainstreaming and implementation. Both the challenges and the enablers identified here are also found in the wider CCA literature and

would need to be addressed as a 'whole' in order to overcome the main challenges. Despite CCA being localized phenomenon, responding to CC requires all level of government to collaborate. National government have the ability to tap into international adaptation funds, as well as help increase political will and support for CCA approaches such as EbA (Chevallier, 2012; Noble et al., 2014). Local governments are key actors in EbA mainstreaming, as they are responsible of communicating and translating goals and policies from higher governmental level to the community, as well as supporting and upscaling local initiatives (Noble et al., 2014). However, though there exists potential for local government to establish good communication, collaboration and support, often local government are lacking resources and this results in CCA approaches, like EbA, being side lined. Therefore, integrating and including EbA into planning processes, development and strategic objectives, and mandates is imperative to improve government officials access to funding, and human and technological resources (Roberts et al., 2012; Zölch et al., 2018).

As general decision making in government often gives more attention to short-term, tangible issues and benefits than long-term risk and threats, it would be beneficial for EbA projects to align with other development activities to enable better mainstreaming (Chevallier, 2018). Providing tangible evidence and effective demonstration of EbA is a central enabler to overcome the challenges presented above as well as assist in mainstreaming and implementation. Despite, lack of EbA evidence, drawing on lessons from other similar projects can help increase evidence and demonstration (Reid et al., 2019). Choice of words and understanding government officials day-to-day work can improve communication and translating of EbA information and knowledge in ways that is clear to government officials. And, identifying local champions can strengthen networks and collaboration, they can also offer assistance in translating knowledge and demonstration of EbA across departments as well as in the community.

Chapter Five: Conclusion

5. Introduction

In South Africa, several government documents have been put forward in order to ensure successful implementation and mainstreaming of EbA. However, despite the support, the Western Cape has yet to see EbA translate from theory to practise. The aim of this study was, therefore, to explore a common 'ground' for EbA in the Western Cape that would help facilitate and expedite its implementation. I did this by investigating the diversity of meaning attached to the concept of EbA, and the barriers and enablers to mainstreaming.

In order to achieve my aim, I set out three objectives. Objective 1 focussed on 1) unpacking how government actors in the Western Cape relate to, understand and give meaning to EbA in their specific and existing work context, and furthermore, 2) how they relate EbA to other concepts such as green infrastructure, restoration and various forms of natural resource management. Objective 2 explored the concerns and challenges encountered and what support is needed to implement EbA within their sector. In this final chapter, Objective 3 will be addressed, as it intends to interpret what the findings mean for future conceptualization and promotion of EbA mainstreaming in the Western Cape.

5.1 Overview of Key Findings, and What These Findings Mean for Conceptualization and Promotion of EbA Mainstreaming in the Western Cape

5.1.1 Ensuring a Common Conceptualization of EbA

In Chapter 3, which specifically addressed objective 1, I show, through the findings from interviews with participants and the literature, that EbA should be framed as a concept that can 'guide' projects based on three main spheres of concern (socio-economic benefits, conservation of ecosystems and biodiversity, and CC adaptation). The three spheres can act as the 'boundary' or 'structure' for EbA and guide government officials when planning and implementing EbA projects, or in converting existing ecosystem service based projects such as restoration initiatives, to be more EbA like in terms of what they deliver. It can help government officials understand how EbA links to other approaches as well as make it easier to recognize EbA type activities across different sites. The 'boundaries' or 'structure' allows a variety of activities to fall under EbA but also reminding the practitioners to address all three spheres to ensure a successful outcome.

This flexible conceptualization, without too many rigid requirements, can help support practitioners starting new EbA projects or modifying already on-going activities in the Western Cape to EbA (Aronson et al., 2019). However, findings from Chapter 3 also suggest, without increasing CC understanding and how to actively engage and integrate CC into EbA projects, practitioners will struggle to successfully address CC as one of the critical areas of EbA. Furthermore, more evidence of projects that successfully tackle these three key domains of EbA and, moreover, how they were able to achieve this are required. In turn, this requires more attention to monitoring of the outcomes for the different spheres and the kind of indicators that may be used.

5.1.2 Comments and Recommendations to Promote EbA Implementation and Mainstreaming in the Western Cape

By explicitly addressing objective 2, Chapter 4 explored the concerns and challenges, as well as what support is needed for EbA implementation and mainstreaming. Besides for the conceptual challenge of EbA identified in Chapter 3, several generic challenges can be found in the South African government structure. In particular, the procurement systems of many departments and the priorities of other pressing socio-economic issue affects government officials access to funding and resources, good collaboration, and support for long-term projects. In terms of enablers, providing effective demonstration and tangible evidence of EbA can help mitigate all the above challenges, as well as provide support for EbA uptake and mainstreaming. Use of appropriate language when communicating and sharing EbA knowledge, and the use of champions are also effective enablers. Overall, it is important to note that the challenges and enablers are interrelated, and it is essential to address these challenges simultaneously. Figure 5.1 below is an illustration of the major findings from the two result and discussion chapters and provides one example of how they can contribute towards better mainstreaming of EbA.

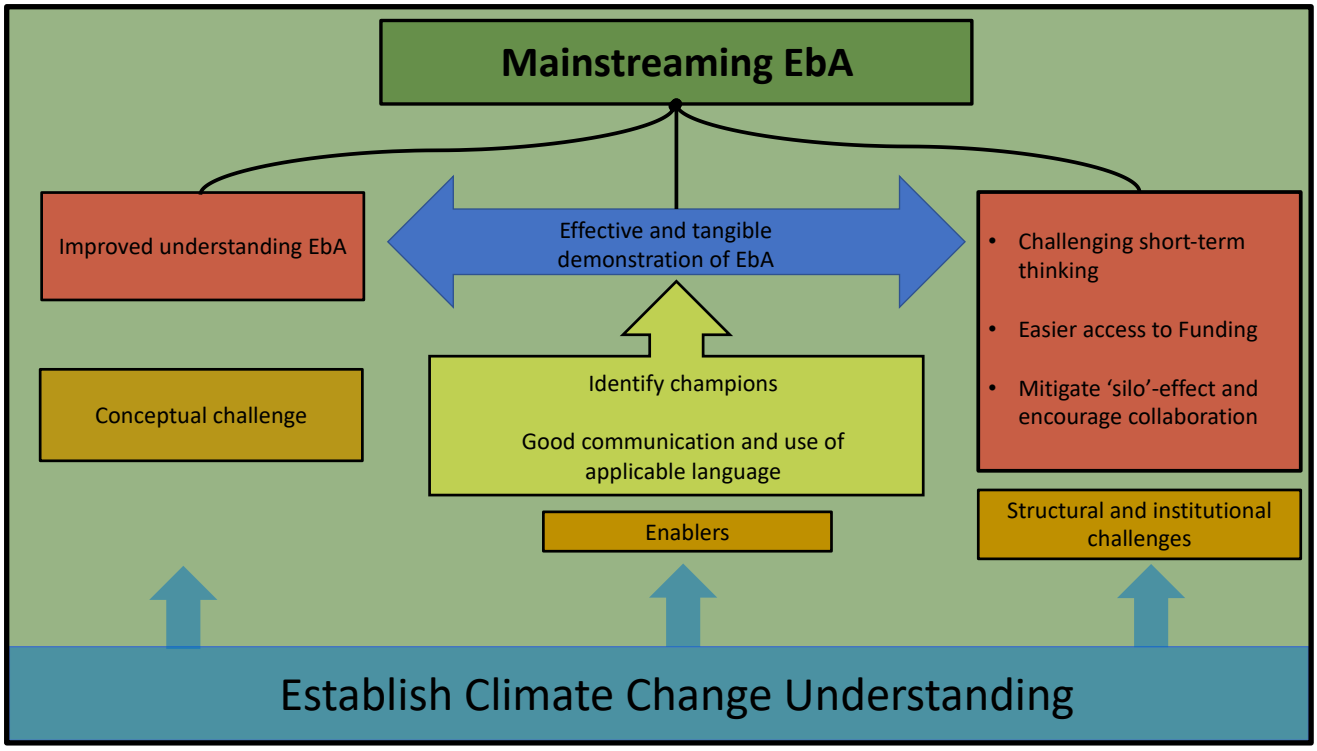

Figure 5.1: Illustration of how the challenges and enablers are interactive.

Although it is changing, there is still room to improve CC understanding and its impacts in the Western Cape government (Pasquini & Cowling, 2015). One recommendation to help promote EbA mainstreaming would be to establish a 'decent' base of general CC understanding across the Western Cape government. Understanding how CC impacts might affect the economy, ecosystems and communities can help government official integrate CC science, projections and information into their work. This is particularly essential in local government and in departments outside the environmental sector (such as Department of Human Settlement). With improved understanding of CC outcomes, support for EbA will possibly increase both at a local level, as well as at the highest political level (Chevallier, 2012).

Increased CC understanding can, together with effective demonstration of EbA, help improve EbA uptake and implementation as well as address challenges regarding funding, silo and short-term thinking. Good demonstration of EbA would include evidence of good collaboration across a variety of stakeholders, which can help break down 'silos' as well as the outputs from a monitoring and evaluation system as described above. Effective demonstration and tangible evidence can create a better uptake of EbA and make funding for EbA projects more accessible for government officials. Another recommendation to improve government officials access to resources, is to integrate EbA into government planning, strategic objectives and in the

Integrated Development Plans of municipalities (Ziervogel et al., 2016). Moreover, having EbA align with other development activities can avoid EbA being side-lined, and EbA can rather be promoted as an important contribution to achieve development and adaptation objectives (Chevallier, 2012).

5.2 Final Words

When I started my master's degree in 2018, the Western Cape drought limited the population to 50 litres of water per person per day in Cape Town. The same year, Europe experienced a series of heatwaves and California had one of the biggest wildfires ever recorded, destroying homes and close to a million acres. In Kerala, a coastal state in India, extreme weather events claimed over 300 lives and left many thousands of people homeless. In 2019, cyclone Kenneth hit northern Mozambique at the peak of harvesting season causing food insecurity as well as severe flooding and landslides. Hurricane Dorian, the most powerful hurricane to ever hit land in the Atlantic, demolished homes and claimed close to 73 lives in the Bahamas. At the end of 2019, ash was raining down in Sydney Australia due to multiple bushfires around the country. Millions of mammals, birds and reptiles are affected by the fires, and as a result, many species are threated to extinctions. These are few examples of extreme events that the world has experienced and will continue to experience. Already, due to CC, these events have and will continue to become more frequent and more intense. Increasing human and non-human resilience to withstand these extreme events, and adapting to current and future changes has never been more imperative (Sierra-Correa & Cantera Kintz, 2015).

The need for comprehensive approaches that can bring about benefits for the economy, society and ecosystems, as well as mitigate the adverse effect of CC is incredibly important. Ecosystem-based adaptation has been recognized as such an approach and is seen as a key response that may have less adverse effects than, for example, hard infrastructural solutions (Munang et al., 2013). However, while the value of EbA in CC response has been recognised at a high level in South Africa, the country still needs to find ways to incorporate EbA into the local level of CC and development actions, which are generally implemented by the lowest tier of government. Only in this way can we reduce future risks and ensure the resilience of our social-ecological systems and people's well-being country wide.

This study has shed some light on how government officials that need to implement EbA relate to the concept, and what might be needed to increase the uptake of the strategy in order to move forward with mainstreaming. It seems important to allocate time and resources for training and knowledge sharing, starting with increasing awareness of CC and the future risks associated with different places in the country. Thereafter, providing evidence of how EbA can play a key role in mitigating these risks, as well as establishing mechanisms and funding for collaboration across sectors is essential. Learning and drawing lessons from similar projects is needed to inform EbA and to pave the way for future upscaling. Further research is needed to explore how collaborative efforts between different sectors and actors, especially between educational and research institutions and government, could help increase the uptake of knowledge and improve the understanding of CC impacts and the role of EbA in reducing these amongst government officials. Such collaborations could enable and incentivise new ways of creating knowledge and new spaces for stimulating change and transformation.

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9. Appendices

9.1 Guide for semi-structured interviews

Procedure:

- Presentation of who I am and the purpose of this research.
- Brief explanation of the interview process
- Obtain signature of the consent letter by the interviewee

Questions:

Name:

Age:

Work:

1. **Work**
    a. What is your work description and responsibility?
    b. How long have you been working here?

2. **Climate change, adaptation and Ecosystem – based adaptation**
    a. (Considering your line of work,) how do you think about climate change? // What is climate change for you?
    b. How is climate change mentioned within the work zone?
    c. When it comes to responding to climate change, how familiar are you with the term adaptation?
        i. Is there any strategy within adaptation that comes to your mind, any you might prefer?
    d. The role of nature and the services it provides for human well-being has gained a lot of attention recently, also in terms of adaptation. How central do you find the role of nature in the debate of climate change?
    e. Has EbA come up as a way of responding to climate change?
    f. Is it a familiar strategy to you and here at your workplace?
        i. If so, how were you informed? // how did you come across it?

g. Have you read any of the documents from DEA and SANBI and how familiar are with them?
    i. If so, has any of the information been useful?
    ii. If not, what is the reason for it not being useful?

3. Ecosystem-based Adaptation

a. Can you tell me what you know about EbA?
    i. What does the concept mean to you?
    ii. Your understanding of EbA?
    iii. What is the general feel about EbA?
    iv. How does the concept come across in terms of clarity?
b. How do you experience the concept in relation to other concept such as ecological infrastructure, urban greening etc? (With consideration to it being referred to as a "buzz" word by some people)
c. Have you been a part of a project where EbA has been a part of the strategy?
    i. If so, what was your experience with EbA?
        1. How did your experiences differ from how EbA is defined in these documents and in general?
    ii. If not, given your meaning of EbA, how do you see it being applied at your work? // How are you able to relate EbA to your work?

4. Introduce the Net – Map toolbox.

a. If you have been a part of a project, how did the structure of the stakeholders look like? Please, visually express
b. If you have not been part of a project but had to apply EbA, who do you think would be the key stakeholders? Please visually express.
c. Sub – questions to Net – Map toolbox:
    i. Who are involved in the process?
    ii. How are they linked or maybe not linked?
    iii. How much influence do the different stakeholders have?
d. Are there aspect of EbA you feel the theory or other documents are missing when it comes to planning and implementing the strategy? If so, please elaborate.

5. **Challenges and opportunities**
    a. Have you experienced any challenges in planning and implementing EbA?
        i. Was there anything in particular you were missing? In terms of support, collaboration
    b. If not been a part of any activity regarding EbA
    c. Have you been a part of an activity/project that included related concept, such as alien clearance or restoration, and do you think you could somehow link that to climate change understanding, and then you would be able to call it EbA – would that work for you?
    d. Can you foresee any challenges in planning and implementing EbA?
    e. What do you think needs to be done to have a better planning and implementation period?
        i. Or in case of participating in a successful project, what made it successful?

9.2 Consent form

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RESEARCHER: Marte Nogva Mårstøl
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URL:

Informed Voluntary Consent to Participate in Research Study

Project Title: "Grounding" Ecosystem – based adaptaion (EbA) in the Western Cape

Invitation to participate: You are invited to participate in a research study conducted with government officals on the topic of ecosystem-based adaptation (EbA) in the Wester Cape. The study aims to develop an understanding of how EbA is being understood and operationalized by different actors who work at the human – environment interface within the City of Cape Town and Western Cape Province. I believe that your experience would be a valuable source of information, and hope that by participating you may gain useful knowledge of others' persepctives.

Procedures: During this study, I will ask you to participate in a semi – structured interview related to your understanding of EbA related approaches and how you are implementing this in your work.

Recording: I would like to, record an audio of our conversation for later transcription and analysis as part of the study. If you object to this, please indicate this below

Risks: There are no potentially harmful risks related to your participation in this study.

Disclaimer/Withdrawal: Your participation is completely voluntary; you may refuse to participate, and you may withdraw at any time without having to state a reason and without any prejudice or penalty against you. Should you choose to withdraw, the researcher commits not to use any of the information you have provided without your signed consent. Note that the researcher may also withdraw you from the study at any time.

Confidentiality: All information collected in this study will be kept private in that you will not be identified by name or by affiliation to an institution. Confidentiality and anonymity will be maintained in impersonal identifiers (e.g. Interviewee A, B, C, etc.).

What signing this form means:

By signing this consent form, you agree to participate in this research study. The aim, procedures to be used, as well as the potential risks and benefits of your participation have been explained verbally to you in detail, using this form. Refusal to participate in or withdrawal from this study at any time will have no effect on you in any way. You are free to contact me, to ask questions or request further information, at any time during this research.

I agree to participate in this research (tick one box) ☐ Yes ☐ No _____ (Initials)

I agree to be audio-recorded ☐ Yes ☐ No _____ (Initials)

_____	_____	_____
Name of Participant	Signature of Participant	Date
_____	_____	_____
Name of Researcher	Signature of Researcher	Date