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# Perceptions surrounding Madikwe Game Reserve's current management: implications for sustainability and future climate change responses

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# Perceptions surrounding Madikwe Game Reserve's current management: Implications for sustainability and future climate change responses

by

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**Dissertation**

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in

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Johannesburg, South Africa

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24 March 2022

# Declaration

I declare that this dissertation is my own, unaided work. It is being submitted for the Degree of Master of Science (by dissertation) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.



Amy Simone Galvao

13th Day of May 2022 at Johannesburg.

# Dedication

This work is dedicated to my parents, Eve and Tony Galvao, and to my late grandparents, Madeleine and Doug Johnston, who have always believed in me even when I struggled to believe in myself.

# Abstract

Ecotourism Based Protected Areas (ETBPAs) are becoming more vulnerable to climate change impacts, hindering their ability to safeguard ecosystems and ecotourism products. A bottom-up understanding of ETBPA's social-ecological systems could potentially provide climate change impact management solutions. Using a case study approach, this study gains a bottom-up understanding of Madikwe Game Reserve's (MGR) social-ecological system through the perceptions of 31 on-site community members (OSCMs) through semi-structured interviews. These perceptions focus on MGR's current management and the implications for MGR's, and similar ETBPA's, sustainability, both currently and in the face of future climate change. Findings indicate governance inefficiency, ecotourism-focused management priorities, and scientific knowledge gaps have caused major implications for MGR's ecological sustainability, mainly through the cascading impacts of an elephant overpopulation. These management issues also limit MGR's ability to respond to climate change impacts both currently and in the future



# Key Words

Perceptions; Ecotourism; Protected Areas; Governance; Management; On-Site Community Members; Climate Change; values; bottom-up understanding

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Thank you to my family, friends, loved ones and Princess Henry for your unwavering love, support, and patience in what has been the most challenging two years of my life. Thank you for being there to pick me up and dust me off each time I fell. I would not have made it this far without you!

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# ABBREVIATIONS AND ACRONYM LIST

| | | |
|---|---|---|
| ETBPA | - | Ecotourism Based Protected Area |
| HO | - | Honorary Officer |
| IPCC | - | Intergovernmental Panel on Climate Change |
| MFC | - | Madikwe Futures Company |
| MGR | - | Madikwe Game Reserve |
| NWPB | - | North West Parks Board |
| OSCM | - | On-Site Community Member |
| PA | - | Protected Area |

# CHAPTER 1

# INTRODUCTION

## 1.1. INTRODUCTION

In theory, Ecotourism Based Protected Areas (ETBPAs) create spaces in which safeguarding ecosystem services and increasing socio-economic development can work hand-in-hand. The basis for ETBPA's is the need to balance the prioritisation of people, planet and profit (Chiutsi et al. 2011). However, in practice this balancing act is more an art than a perfect science. Throughout the literature there are numerous examples where socio-economic development of vulnerable communities are not delivered in the ways they were promised by the ecotourism venture (i.e. (Bologna 2008; Mnini and Ramoroka 2020)). Similarly, there are numerous examples where the ineffectiveness of ecosystem service safeguarding by ETBPAs resulted in the areas being transformed into more profitable land uses (i.e. (Cook et al. 2017; De Vos et al. 2019).

Fundamental management decisions for Protected Areas (PAs) are often top-down and frequently made by people who are detached from the landscape itself (Bologna 2008; Gaymer et al. 2014). Yet, various studies have shown how harnessing local community knowledge can improve Protected Area (PA) management, including that of ETBPAs (Mutanga et al. 2015; Abukari and Mwalyosi 2020; Zhang et al. 2020). However, there has been a call for an inclusion of more bottom-up approaches to PA management as the recognition that people who are entrenched in the system experience a place attachment to the landscape grows. Additionally, the literature has also indicated an increased acknowledgement of the value of Local and Indigenous knowledge of the system (Berkes 2002; Gaymer et al. 2014; Agyeman 2014; Dam Lam et al. 2019). This place attachment can potentially act as an incentive for people living in the landscape to use their knowledge to help ensure the PA's longevity (Brown and Raymond 2007; García-Martín et al. 2018). However, although this local bottom-up knowledge base is considered important for PA management, these local community members do not necessarily hold great decision-making power in the

system (Bologna 2008; Bennett and Dearden 2014; Bologna and Spierenburg 2015). The diversity of knowledge and perceptions of people who live and work in the landscape is a valuable resource that can be leveraged. This has created an environment where government officials, investors and staff can all experience place attachment but with differing perceptions and values based on their priorities in the system (Bennett 2016; Brown and Raymond 2007; Jones et al. 2018).

In developing countries like South Africa, the longevity of government owned ETBPAs can be put at risk due to severe underfunding (McCarthy et al. 2012; Lindsey et al. 2018). As a result, increased reliance is placed on private investments to keep ETBPAs economically viable. However, as a result the management of ETBPAs tends to be more in line with increasing profit potential rather than safeguarding ecosystems (Seddon 2010; Kirkby et al. 2010; Chiutsi et al. 2011; Anderson et al. 2015).

The trade-offs between maximizing short term ecotourism and ecological benefits of ETBPAs have major implications for its sustainability. Yet, identifying different perceptions of how and why these trade-offs are considered can potentially aid in providing holistic solutions formed through the collaborations of multiple knowledge bases (Tengö et al. 2014; Agyeman 2014; Dam Lam et al. 2019). This approach can potentially satisfy social development, profit, and ecosystem service safeguarding goals simultaneously. Therefore, it is crucial to incorporate as many knowledge bases and perceptions of the ETBPA as possible when making decisions to increase governance resilience through a more diverse approach to management (Galaz 2005; Cumming et al. 2015; Choi et al. 2021).

It is particularly important to foster resilience in ETBPAs to the impacts of climate change (Mkiramweni et al. 2016; Day and Noakes 2021). The Intergovernmental Panel on Climate Change (IPCC) (2022) has noted that Southern Africa in particular is predicted to experience harsher impacts of climate change. Expected impact includes an increase in frequency and intensities of drought which pose major implications for the sustainability of its ETBPAs (Mkiramweni et al. 2016; IPCC 2022). While there is a plethora of literature dedicated to climate change impacts on PAs (Mkiramweni et al. 2016; Chersich and Wright 2019; Day and Noakes 2021; IPCC 2022), and associated responses needed (Jørgensen and Termansen 2016; Chersich and Wright 2019; Jamaliah and Powell 2019), there is very little evidence of climate

change response plans being an integral part of ETBPA management specifically. This suggests a research and management gap for ETBPA ecological and economic longevity. With ETBPAs being unique in their specific locations, habitat, climate, ecotourism products, and social dynamics it is important that generic management approaches to sustainability and climate change responses are tailored to meet the needs of the intraspecific nuances of ETBPAs to better ensure their success (Chin et al. 2019).

This study aims to harnesses the rich and diverse perceptions of on-site community members (OSCMs) to better understand the intricacies and feedbacks of the ETBPAs social-ecological system. By harnessing these diverse perceptions, we can identify what management impacts are occurring in 'real-time' as felt by on-site community members (OSCMs). By harnessing the perceptions of people who may be diverse in their knowledge and positions in ETBPAs, but potentially unified in their place attachment as OSCMs (Brown and Raymond 2007; Abson et al. 2017), this study can potentially provide a more intricate bottom-up understanding of the system, which may assist in the management decisions that ultimately impact OSCM's work and home lives.

This study uses Madikwe Game Reserve (MGR) as its case study as the reserve is internationally recognised for its successful niche luxury ecotourism market based on charismatic species game-viewing (Magome et al. 2000; Rhys 2020; Szott et al. 2020). However, the reserve also has a land-use legacy of intensive cattle farming which has caused major land degradation feedbacks, creating serious sustainability implications (Hudak and Wessman 2001). The reserve is remotely located in the North West Province meaning that most of its management actors live on-site along with local community members who work in the reserve. As a result, the reserve has a vastly diverse on-site community that has the opportunity to provide insightful perceptions to improve its sustainability making it an ideal candidate for this kind of research.

### 1.1.1 AIMS, OBJECTIVES AND RESEARCH QUESTIONS

The ultimate aim of this study is to understand how MGR's current management is perceived by its OSCMs and what implications this might have for its sustainability and future climate change responses. I argue that capturing the diversity of perceptions in MGR's system can potentially provide an intricate bottom-up understanding of the

system. This can improve the resilience of MGR's governance by potentially identifying management issues in 'real-time'. This can provide an insight into where management focus may need reprioritization, especially when considering climate change impacts and the management responses thereof. This will be achieved through meeting the following objectives and research questions:

1) To identify OSCM perceptions of current areas of management concern
    - Research Question 1: What do OSCMs currently perceive to be areas of management concern in MGR?
2) To identify OSCM perceptions of current areas of concern specifically relating to sustainability.
    - Research Question 2: What do OSCMs currently perceive to be areas of management concern that specifically relate to the sustainability of MGR?
3) To identify OSCM perceptions of climate change and its management in the reserve both currently and in the future
    - Research Question 3.1: How do OSCMs perceive current climate change impacts in MGR?
    - Research Question 3.2: How do OSCM perceive current climate change management in MGR?
    - Research Question 3.3: How do OSCM perceive climate change to impact MGR in the future?
4) To understand perceptions and priorities of OSCMs in the management of climate change responses
    - Research Question 4: What recommendations would OSCMs put into place to assist MGR in improving its climate change responses in the future?

## 1.2. LITERATURE REVIEW

### 1.2.1. COMPLEX ADAPTIVE SOCIAL ECOLOGICAL SYSTEMS

The safeguarding of the Earth's ecological integrity and its resulting ecosystem services are vital for human existence (Millennium Ecosystem Assessment 2005; IPCC 2022). However, the Anthropocene is characterised by a global environment in which ecosystems are either directly or indirectly impacted by human activity with consequences for the maintenance of ecosystem services and associated human wellbeing (Ostrom 2009). Social-ecological systems recognize the complex, intricate, interlinked and interdependent relationships between people and nature (De Vos et al. 2021). The non-linearity and heterogeneity of the interactions between the social-ecological system's components can cause major challenges for the system's management and safeguarding of its ecosystem services (Levin et al. 2013).

Ecosystem services are the vital benefits that nature provides to people (Millennium Ecosystem Assessment 2005). The Millennium Ecosystem Assessment (2005) categorizes ecosystem services into four main typologies: regulating (e.g. climate regulation), provisioning (e.g. food source), supporting (e.g. nutrient cycling), and cultural (e.g. recreation) (Millennium Ecosystem Assessment 2005). However, ecosystem services are impacted by human activity through various pressures and stressors (Palomo et al. 2014; Cumming 2016). These impacts include climate change, biodiversity loss, and a continuously diminishing and fragmented space in which wild fauna, flora, and ecosystem services can exist (Palomo et al. 2014; Perring et al. 2016; Arias-Arévalo et al. 2018). Due to the complex and intricate nature between the components within a social-ecological system, the management of such a system can only consider one constant: that it is ever-changing (Cumming 2016).

Protected Areas (PAs) are social-ecological systems and are by nature, complex and adaptive (Preiser et al. 2018). PAs consist of intertwined social, economic and ecological components that are constantly indirectly or directly interacting and

feeding back on each other in complex and non-linear ways (Preiser et al. 2021). However, although social-ecological systems interact within certain internal thresholds, these systems pressures and stressors that can potentially alter the ecosystem services of the system (Figure 1.1) (Biggs et al. 2012; Cumming and Allen 2017). Therefore, the resilience of social-ecological systems is an important factor to consider when managing PAs to keep them within sustainable thresholds (Cumming and Allen 2017). A social-ecological system's resilience determines the capacity of a social-ecological system to recover from disturbances and resist change beyond its threshold that may cause negative implications for its ecosystem service efficiency and ecological integrity (Levin et al. 2013; Cumming 2016; Preiser et al. 2021). Therefore, PA management needs to be cognizant of management plans that are aimed at increasing a PA's social-ecological system's resilience to ensure the PA's sustainability (Biggs et al. 2012; Levin et al. 2013; Cumming 2016; Preiser et al. 2021).

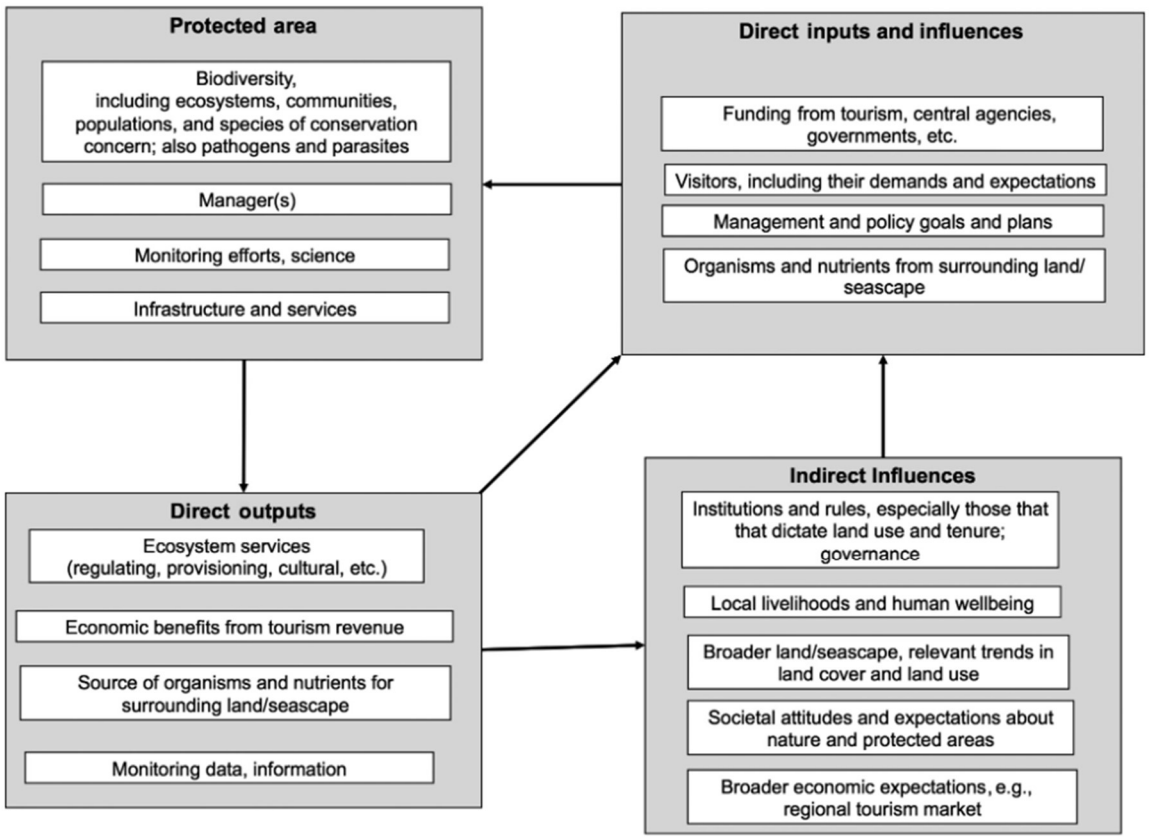


**Figure 1.1:** A framework indicating the systems perspective of social-ecological feedbacks in protected area management, indicating both direct and indirect outputs and influence dynamics as taken from Cumming and Allen, 2017 (p1711*)*

### 1.2.2. IMPORTANCE OF PROTECTED AREAS

The establishment of PAs is seen as a fundamental global response to safeguard ecosystem services and biodiversity (Hill et al. 2015; Milatović et al. 2019). As complex adaptive social-ecological systems, PAs interact with each other, and the landscapes in which they exist at multiple scales (Cumming et al. 2015). Thus, PA's safeguard ecosystem services far beyond their boundaries (Costanza et al. 1997; Whitham et al. 2015). However, the literature has noted that the evidence for PA success in achieving international goals of sustainability is far from unequivocal (Newmark 2008; Palomo et al. 2014; Cumming et al. 2015; Cumming and Allen 2017; Mace et al. 2018).

PAs are artificial environments created by Anthropogenic-driven circumstances (Arcese and Sinclair 1997; Brockington et al. 2008; Newmark 2008). Although one of their main purposes is to safeguard naturally occurring biodiversity, landscapes, and ecosystem services (Cantú-Salazar and Gaston 2010; Cumming 2016), they are inevitably hampered by human activity with varying intensity (Josefsson et al. 2009; Belsoy and Korir 2012; Cumming et al. 2015; Dube and Nhamo 2020).

Generally, PAs are similar in their overarching goal of safeguarding ecosystem services and their components. However, they are all subjectively unique - their social-ecological dynamics relating to location, intraspecific management objectives, biodiversity composition, internal social dynamics, and management approaches all contribute to an individual PA's resilience, sustainability and efficacy (Cumming and Allen 2017; Jones et al. 2018; Abukari and Mwalyosi 2020). The different ways in which PAs are managed have serious implications for their efficacy when it comes to achieving the above goals (Leverington et al. 2010; Allen et al. 2019). While there are multiple broad strategies for PA management such as: [strategic] adaptive management (Venter et al. 2008; Roux and Foxcroft 2011), co-management (Thondhlana et al. 2016), adaptive co-management (Fabricius et al. 2007), integrated landscape management (Mann et al. 2018), etc.) all of which recognize the complex social-ecological nature of PAs, many PAs are still managed as islands of conservation in a sea of degradation (Cartwright 2019). There is also a tendency for many management strategies to focus solely on the goals within a particular PA's geopolitical boundaries, rather than taking the multiscale function of the ecosystem

services within it into account. This has resulted in fragmentations in ecosystem service safeguarding (Leverington et al. 2010; Cumming et al. 2015; Cartwright 2019).

### 1.2.3. ECOTOURISM BASED PROTECTED AREAS

Ecotourism is viewed by many as a panacea for PAs (Goodwin 1996; Ghosh and Ghosh 2019). Ecotourism is said to promote the safeguarding of a PA's ecosystem services and biodiversity conservation through the socio-economic incentives that tourism brings to the area (Pegas and Castley 2014; Buckley et al. 2016; Agyeman et al. 2019). Therefore, the three main issues of social development, economic development, and biodiversity conservation discussed in a 'Triple Bottom Line' approach (Harte 2001; Runge et al. 2019) are all theoretically catered for (Pegas and Castley 2014; Mathis and Rose 2016; Demir et al. 2016; Agyeman et al. 2019; Ghosh and Ghosh 2019).

How these ecotourism based PAs (ETBPAs) achieve their goals is heavily reliant on the effectiveness of their management strategy, especially because most ETBPAs in South Africa are fenced systems containing wildlife that historically would roam areas far greater than that which ETBPA fenced perimeters will allow (Selier et al. 2018) . Therefore, the management of wildlife populations and their habitats require a fine balancing act of maintaining the ecological integrity of the landscape and meeting ecotourism needs of charismatic- and value- species game-viewing (Selier et al. 2016, 2018).

ETBPA management involves the integration of many actors. This is usually made up of the following parties (Mathis and Rose 2016; Valverde Sanchez 2018; Ghosh and Ghosh 2019):

- Government: Generally acting in the position of 'landlord' of a state-owned PA, with the main objective of using the PA to meet international conservation goals. Government also formulates and enforces laws and policies pertaining to PAs and their management.
- Local community members: The people who live within close proximity to the PA, who are usually economically vulnerable, and who tend to benefit from ecotourism via job creation and other social development initiatives surrounding

the PA. However, local community members can also be isolated from resources found within the PAs which can cause conflict between local communities and PA management (Bologna 2008; Thondhlana et al. 2016).

- Private investors: Individuals and businesses who invest in the PA's ecotourism sector with the intention to create a profit and who also provide jobs for local community members through their ecotourism investment ventures
- Tourists: Individuals who travel to the PA generally for the cultural ecosystem services that it offers whilst simultaneously being educated about conservation and acting as the source of revenue that provides the resources to maintain biodiversity (and therefore ecosystem services) conservation efforts.

### 1.2.4. PROBLEMS FACED BY ECOTOURISM BASED PROTECTED AREAS

While ecotourism is seen to be the obvious 'win-win' approach to safeguard ecosystem services and biodiversity in theory, the reality of its implementation is far from the utopia it promises (Bologna 2008; González Fonseca 2012; Bologna and Spierenburg 2015; Demir et al. 2016; Ghosh and Ghosh 2019).

Firstly, when considering the socio-economic aspect, local community members are often seen as 'stick holders' rather than 'stakeholders' in the government-community-investor tri-party alliance that many ETBPA strategies are founded upon (Bologna 2008). Bologna (2008) used the 'stick holder' versus 'stakeholder' comparison to indicate the power imbalances usually experienced by local community members. Previous research has shown that ecotourism often exacerbates the socio-economic inequalities between actors, with revenues and benefits rarely reaching the local communities in the ways in which they were promised (Bologna 2008; Bologna and Spierenburg 2015; Ghosh and Ghosh 2019; Mnini and Ramoroka 2020). Local community members are also known to experience further disadvantages of PAs by being isolated from resources found within the PA (e.g. sacred ancestral grounds, provisioning resources, etc.) (Bologna 2008; Thondhlana et al. 2016) as well as experience human-wildlife conflict such as crop damage and death from interactions with wildlife found within PAs (Hoare 1999; Di Minin et al. 2021).

Ecologically speaking, ecotourism brings about more localised human impact and pollution to the PA (Josefsson et al. 2009; Ghosh and Ghosh 2019). The impacts of

transportation within and to PAs that are often located far from main economic hubs (Belsoy and Korir 2012); the impacts associated with the accommodation of guests and staff in the PA; the tourist activities within the PA (Lew 1998; Belsoy and Korir 2012); and the human-imposed management of a geopolitically determined boundary of the PA all inevitably hinder conservation efforts aimed at maintaining areas in their most 'natural state' (Josefsson et al. 2009; Mona et al. 2019). Fenced ETBPAs containing wildlife add additional pressure on the ecological system through human controlled wildlife population densities and restricted migratory movements which do not allow effective vegetation replenishment (Chiutsi et al. 2011). ETBPA managing actors need to ensure a fine balance of charismatic- and value- species population densities. However, the literature indicates that species biodiversity and densities in ETBPAs are usually designed to favour ecotourism game-viewing purposes rather than instilling a homeostasis of biodiversity and maintaining ecological integrity (Harte 2001; Runge et al. 2019).

When looking at how ETBPAs are managed, the diversity of multi-stakeholder governance should, in theory, bring about a sense of resilience to an ETBPA due to the plethora of knowledge backgrounds and skill sets available to ensure the PA can maintain its social, economic, and ecological balance (Bennett, 2016; Jørgensen and Termansen, 2016; Otto-Banaszak et al. 2011). However, a diversity of knowledge backgrounds, perceptions and priorities can also be the underpinnings of conflict amongst management actors which decrease the teamwork and ultimately effectiveness needed in governance processes, consequently decreasing resilience (Berbés-Blázquez et al. 2016; Múnera and van Kerkhoff 2019; Muthoora and Fischer 2019). A lack of management actor cohesion in PA management has particularly serious implications for the current effectiveness of PAs and their ability to address and prepare for potential future impacts (Baird et al. 2014).

In southern Africa, some of the most socio-economically successful ETBPAs attribute their success to charismatic species, especially the 'Big 5' attractions ((African elephants [*Loxodonta africana*], rhino (both black and white, [*Diceros bicornis*] and [*Ceratotherium simum*]), leopards [*Panthera pardus*], lions [*Panthera leo*], and buffalo [*Syncerus caffe*r]) (Buckley et al. 2016; Holechek and Valdez 2018; Arbieu et al. 2018). However, these particular charismatic species require a large amount of space to

ensure that their involvement in the ecosystem is beneficial and not destructive (Lindsey et al. 2005; Li et al. 2012; Boeyens and van der Ryst 2014; Arbieu et al. 2018; Szott et al. 2020). The importance of maintaining wildlife populations is growing in importance as current human population expansion and resulting increase in urbanization has brought humans increasingly closer to ETBPA's boarders (Pfeffer et al. 2001; Snyman and Bricker 2019; Achiso 2020; Wang et al. 2021). This indicates that it will be increasingly difficult to expand ETBPAs should the safeguarding of its ecosystem services demand it (Odendaal-Holmes et al. 2014; Szott et al. 2020; Di Minin et al. 2021).

Essentially, what is good for ecotourism's economic prosperity is not necessarily good for the ETBPA's ecological integrity and vice versa (Ghosh and Ghosh 2019; Wang et al. 2021). Therefore, the ETBPA's management of population densities, particularly those of charismatic species, needs to be carefully considered. Furthermore, how ETBPA's choose to control these population densities could have adverse impacts on not only their tourism product (Wylie 2010), but also on the behaviour of the wildlife species they are trying to manage. For example, studies have indicated that the highly controversial management plans involving translocating and culling of elephants have left long term negative psychological impacts on the animals (Koenig 2007; Simon Chamaillé-Jammes et al. 2007; Shannon et al. 2013). However, when other alternative population density management strategies are either too logistically or financially intensive, wildlife managers are left with an extremely difficult decision (Koenig 2007; Wylie 2010). If this challenge is left unaddressed, the future sustainability of the ETBPA will be called into question (Evans et al. 2018; Slotow et al. 2021).

### 1.2.5. CLIMATE CHANGE

Uncertainty is a certainty in ETBPA social-ecological systems impacted by climate change (Carey et al. 2007; Polasky et al. 2011). The latest IPCC Report (2022) has indicated that climate change induced extreme weather events, such as fires, floods, drought, and heat waves, will continue to increase in intensity and frequency in the coming years. The report also predicts that there is a major likelihood that global warming will reach or exceed 1.5$^{o}$C by 2040 (IPCC 2022). This makes climate change response plans increasingly integral to ETBPA management plans and their ability to adapt to and mitigate cascading impacts of climate change (van Wilgen 2009; Bryan

et al. 2009; Lopoukhine et al. 2012; Jørgensen and Termansen 2016; Devisscher et al. 2016; Hobday et al. 2018; Nana et al. 2019; Dube and Nhamo 2020; Rittelmeyer 2020).

The changes in weather and climate can have serious implications for an ETBPA as it is a major contributing factor as to how tourists plan the holidays that ETBPA's and local communities rely on (Chin et al. 2019; Crompton 1979; Pang et al. 2013). Although ETBPA businesses are aware of the importance of climate and weather for their business model, it does not necessarily correlate with awareness and understanding of climate change (Kaján and Saarinen 2013). Common barriers to ETBPA responses to climate change are due to a lack of climate change adaptation and mitigation knowledge, limited resources, and the belief that businesses do not have the ability to adapt or make a difference to climate change (Chin et al. 2019; Kaján and Saarinen 2013). However, these issues surrounding ETBPA management responses to climate change need to be addressed as the continuous rise of anthropogenic pressures will result in more reliance on ETBPAs to effectively safeguard ecosystem services in the face of climate change (Lopoukhine et al. 2012). The increasing change in and uncertainty of ETBPA social-ecological systems caused by climate change places the sustainability of current ETBPA business models into question (Wyborn 2009; Shumba et al. 2021a). Therefore, ETBPAs need to carefully consider the best way to tackle climate change to remain viable (Otto-Banaszak et al. 2011; Chersich and Wright 2019). Ongoing monitoring and management processes of the environment and its climate change impacts are needed to ensure ETBPA resilience (Jørgensen and Termansen 2016).

Although ETBPAs have a management plan with set, non-biased objectives for roles that any individual charged with that role is expected to fulfil, it is important to note that these objective job descriptions are filled by unique individuals - all with their own perceptions, priorities, value systems, knowledge backgrounds, and social dynamics amongst their peers. Any one of these factors have the potential to shift management ideals which may have serious implications for an ETBPA's resilience, sustainability, and efficacy (Rodger and Moore 2004; Otto-Banaszak et al. 2011; Jones et al. 2018). As a result, ETBPA management should urgently look to adopt transdisciplinary adaptive approaches to increase their resilience (Holling 1986; Fazey et al. 2011; De Vos et al. 2016; Cumming 2016; Cumming and Allen 2017; Brenner 2019). However,

the creation of management plans and climate change responses are usually processes that are mainly informed by scientific approaches (Anderies 2015; Arias-Arévalo et al. 2017), which tend to dismiss other knowledge backgrounds, such as those of On-Site Community Members (OSCMs) (Otto-Banaszak et al. 2011; Muthoora and Fischer 2019).

### 1.2.6. IMPORTANCE OF AN ON-SITE COMMUNITY

ETBPAs are usually located in remote areas and as a result the people involved in the management of the ecotourism facilities tend to live and work within the system, creating an on-site community (Dologlou and Katsoni 2016). OSCMs are entrenched in the system and therefore are able to experience management feedbacks in 'real time' (Berkes 2002; Agyeman 2014). 'On-site' knowledge can therefore be crucial in helping identify certain system intricacies that can only be established through day-to-day connections with the landscape such as those experienced by OSCMs within the ETBPA (Tengö et al. 2014). Therefore, this knowledge base is vital to providing a more tailored response to the ETBPA, which can potentially increase its resilience in comparison to generally applicable climate change response strategies (Otto-Banaszak et al. 2011; Armatas et al. 2016)

Evidently, it is important to understand the importance of harnessing the perceptions of OSCMs involved in the system to better understand the finer-interlinking feedbacks to increase governance efficacy and resilience (Stein et al. 2013). However, it is also important to note that a person's perceptions are shaped by their personal values, and so ETBPAs are recognised as human constructs whose management is based on what values decision-makers wish to protect under broad conservation guidelines (Muchapondwa et al. 2012; Barbour and Kueppers 2012; Cumming et al. 2015)

In summary, the way in which stakeholders value ecosystems and ecosystem services is a fundamental element of sustainable PA management (Ostrom 2009). However, the influence of human values on environmental management of PAs has to date, been poorly studied (Floress et al. 2015; Castro et al. 2016; Jones et al. 2016; Arias-Arévalo et al. 2017).

### 1.2.7. VALUES

There are various interpretations of ‘values’ (Stern et al. 1999; de Groot and Steg 2008; Zajchowski and Brownlee 2018). The term is generally used to describe one’s personal guiding principles to evaluate what is ‘important’, ‘good’ or ‘right’ and is shaped by many factors such as: education, needs, upbringing, societal stigma, and influence (Stern and Dietz 1994; Tadaki et al. 2017).

People’s values shape their beliefs and therefore their perception of the world and behaviour (Stern et al. 1999). Consequently, in the context of ETBPAs issues tend to arise from people having differing perceptions as to what has value or what is important enough to protect and maintain (Stern and Dietz 1994; Pascual et al. 2017)). This frequently causes confusion and conflict in transdisciplinary systems whereby people do not value components of the system similarly (Jones et al. 2016; Tadaki et al. 2017). This has major consequences for effective (and equitable) decision-making processes as well as robust management outcomes (Ranger et al. 2016). This problem is particularly prominent in projects which involve the monitoring and management of PAs and their ecosystem services as there are many different social, economic and ecological components to consider (de Groot and Steg 2008; Brenner 2019).

### 1.2.8. VALUE SYSTEMS

Value systems are a conglomerate of broad notions or ‘value domains’ (Arias-Arévalo et al. 2017) that are influenced by certain characteristics (‘value orientations’, also known as value motivations) (de Groot and Steg 2008). These value systems are used by individuals as a trans-situational moral framework to guide their own behaviour and assessment of the world around them (Stern and Dietz 1994; Arias-Arévalo et al. 2017; Costanza 2020).

There are three general value domains (with correlating value orientations) recognised in the scientific field of environmental psychology, namely: *Instrumental, intrinsic,* and *relational* (Chan et al. 2016; Tadaki et al. 2017; Arias-Arévalo et al. 2017; Costanza 2020) (Figure 1.1).

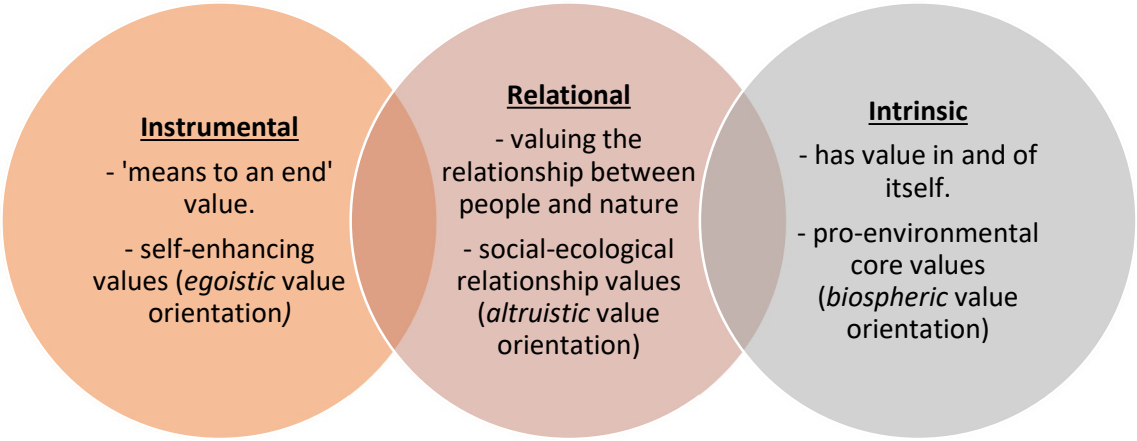


**Figure 1.2:** Relationships between value domains (Arias-Arévalo et al. 2017)

Arias-Arévalo et al. (2017) describe the instrumental value domain as valuing something for its purpose as a means to an end. Individuals who value an entity instrumentally are usually perceiving the entity from an egoistic value orientation (Stern et al. 1999; Arias-Arévalo et al. 2017).

Individuals who have an egoistic value orientation are considered to be self-enhancing; they are predisposed to prioritize themselves and analyse only the personal impact of decisions (Stern and Dietz 1994). Both de Groot and Steg (2008) and Arias-Arévalo et al. (2017) used attributes identified by Stern et al. (1999) to describe egoistic values, such as: economic development, monetary benefit, social power authority, and influence.

In the environmental space, if certain decisions are seen to be personally beneficial during a cost versus benefit debate egoistic individuals will choose the pro-environmental choice (de Groot and Steg 2008; Jones et al. 2016). However, if such a decision is not personally beneficial, egoistic individuals are more likely to pursue activities which are not sustainable or do not portray pro-environmental behaviour (Stern and Dietz 1994).

In the context of ETBPAs, instrumental egoistic values are usually expressed by private investors. For example: private investors, like those who establish lodges in ETBPAs, generally do so with the sole intention of making a profit out of ecotourism ventures (Magome et al. 2000; Krüger 2005; Singleton 2016). Their main concern is

profit and economic development, thus making ecotourism a means to an end, if there was a possibility of a higher cost to benefit ratio, it is likely that investors would go elsewhere (Stern et al. 1999).

Arias-Arévalo et al. (2017) describe the intrinsic value domain as valuing nature, the environment, ecosystems, and ecological processes as ends in themselves, irrespective of their utility to humans. The pro-environmental behaviours of this group are often represented as moral duties (Arias-Arévalo et al. 2017, 2018). Individuals who value an environmental entity intrinsically are usually perceiving the entity from a biospheric value orientation (Stern et al. 1999; Arias-Arévalo et al. 2017)). Individuals who have a biospheric value orientation are predisposed to act on what is seen to be most beneficial for the environment, even if it does not align with what is most beneficial to themselves or other people (Stern and Dietz 1994; de Groot and Steg 2008; Arias-Arévalo et al. 2017). De Groot and Steg (2008) and Arias-Arévalo et al. (2017) used attributes identified by Stern et al. (1999) to describe biospheric values, such as: respecting the Earth, unity with nature, protecting the environment, preventing pollution, and safeguarding ecosystems.

In relation to ETBPA management, intrinsic biospheric values are usually associated with ecologists and environmentalists; their work is mainly centred around ecology and the safeguarding of ecological processes for the sake of nature (Stern et al. 1999). Indigenous and local people who have cultural ties and attachment to place within the ETBPA also often fall within this group (Stern and Dietz 1994; Ranger et al. 2016; Dam Lam et al. 2019). Previously, intrinsic and instrumental value domain contrasts guided environmental decisions by either profiting from ETBPAs through market-based conservation such as payment for ecosystem services or having a protectionist approach to conservation, removing all human intervention (Stern and Dietz 1994; Spash 2013; Martín-López and Montes 2015; Arias-Arévalo et al. 2017). However, the realisation of the complex and interlinked nature of social-ecological systems has shifted the thinking of valuation to a more pluralistic approach (Chan et al. 2016; Jacobs et al. 2016; Tadaki et al. 2017).

Consequently, the valuation spectrum has widened to include relational values. These have been described by Chan et al. (2016) as values concerned with the relationships and responsibilities between different people or between nature and people. The

relational value domain is thus a bridge connecting the antipodal relationship between intrinsic and instrumental value systems (Chan et al. 2016). Instrumental values are underpinned by egocentric concerns whereas intrinsic values are underpinned by ecological safeguarding principles. Therefore, relational values are social-ecological in nature, valuing aspects such as safeguarding cultural values and people's attachment to the landscape, and safeguarding ecosystem services for their benefit to people and life on Earth (Chan et al. 2016; Arias-Arévalo et al. 2018; Zajchowski and Brownlee 2018).

Viewed through the lens of environmental behaviour, relational values have an altruistic value orientation, thus valuing an environmental entity for its benefit to society as a whole (Arias-Arévalo et al. 2017). In terms of ETBPA management, Bennett (2017) notes that there is growing recognition to view conservation as a social concept underpinned by environmental foundations. For example: the conservation of sacred groves (as seen in South India (Prashanth Ballullaya et al. 2019)) and forests (Thathe Vondo forest, South Africa (Sinthumule and Mashau 2020)) that are used for cultural rituals and ancestral burial grounds and are protected by local communities for their spiritual importance (Thondhlana et al. 2016; Prashanth Ballullaya et al. 2019; Sinthumule and Mashau 2020).

Another example is seen by single species conservation. A popular example of single species conservation is that of the rhino [*Rhinocerotidae*] which is considered as a keystone species due to the knock-on effects of its grazing habits (Mills and Soule 1993). Therefore, the loss of the species would cause a dramatic shift in its residing ecosystem and could potentially have cumulative impacts on other ecosystems and their ecosystem services. Furthermore, the rhino species is culturally significant to indigenous communities in Southern Africa (Boeyens and van der Ryst 2014) and eastern Asia (Büscher 2016). In the context of Southern Africa, communities value the rhino as a deity and believe its existence should be protected intrinsically whereas eastern Asian communities culturally value the rhino more instrumentally, believing that the products of the rhino (specifically its horn) provide traditional medicinal properties and social power through status-symbol trinkets (Boeyens and van der Ryst 2014; Büscher 2016; Barbora 2017). Therefore, the conservation of the rhino species is one conducted under relational altruistic values by safeguarding the species not

only for their keystone role in ecosystem service processes which are beneficial to society as a whole, but also to manage and maintain the impacts of their cultural significance.

For ETBPA management to succeed, its goals must be sustainable, recognizing that there needs to be a balance between economic, environmental, and social aspects (Hopwood et al. 2005; Haavaldsen et al. 2014; Costanza 2020). However, as indicated above, stakeholders in ETBPAs may be prone to perceive and value aspects of the social-ecological system differently, creating serious implications for management success (Bruyere et al. 2009; Engen et al. 2019). Therefore, it is important to understand how the system is perceived by its decision-makers.

### 1.2.9. IMPORTANCE OF PERCEPTIONS

The complexity and interconnectedness of ETBPA's can potentially cause the act of achieving one goal in the system to be counterproductive to achieving another. Without strong communication, people involved in decision-making processes of ETBPAs may be prone to perceive and prioritize aspects of the ETBPA's social-ecological system differently, again, creating serious implications for management success (Bruyere et al. 2009; Engen et al. 2019). Different stakeholders will potentially perceive the system differently and, without clear communication, decision makers may not 'see the whole picture' of the system, or the implications choices have for whole system management (Bennett 2016; Tadaki et al. 2017).

This difficulty in holistic perception emphasises the need for multiple interpretations and for decision-making processes to incorporate different system views. It also emphasises the need for clear effective communication and understanding of these different perceptions to identify and manage the system goals in a more harmonious and holistic way (Bennett 2016; Tadaki et al. 2017; Arias-Arévalo et al. 2018).

### 1.2.10. MADIKWE GAME RESERVE AS A CASE STUDY

An example of a multi-perception promoting management structure is the government-community-investor partnerships in South Africa's (Szott et al. 2020) Madikwe Game Reserve (MGR), located in a semi-arid savanna region of the North West Province. MGR is known internationally for its luxury market ecotourism and conservation efforts,

being home to not only the ‘Big 5’ (African elephants [*Loxodonta africana*], rhino (both black and white, [*Diceros bicornis*] and [*Ceratotherium simum*]), leopards [*Panthera pardus*], lions [*Panthera leo*], and buffalo [*Syncerus caffe*r]) but also to other highly ecotourism- and conservation-valued species such as cheetah [*Acinonyx jubatus*] and wild dogs [*Lycaon pictus*] (Davies 2000; Sabeta et al. 2018; Szott et al. 2020).

Due to its predominantly international target market and composition of megaherbivores and apex predators, MGR is a perfect candidate to exemplify the task of meeting a balance between socio-economic development of local communities, fulfilling luxury ecotourism expectations, and safeguarding biodiversity of endangered species, notably black [*Diceros bicornis*] and white [*Ceratotherium simum*] rhino as well as cheetah [*Acinonyx jubatus*] and wild dogs [*Lycaon pictus*] (Lindsey et al. 2007; Mathis and Rose 2016). However, the literature has demonstrated that, like other ETBPA’s globally, MGR has had some challenges in maintaining its social, economic and ecological ‘Triple Bottom Line’ balancing act (Bologna 2008; Sabeta et al. 2018; Szott et al. 2020).

Ecologically, MGR is currently facing severe ecological feedback challenges which will inevitably lead to ecotourism product challenges in the near future if not addressed correctly (Galvao et al. 2018; Szott et al. 2020). Similar challenges have been identified elsewhere in other PAs with an ecotourism focus, e.g. Bürgi et al. (2017), Arbieu et al. (2017), Sabeta et al. (2018). MGR has a land-use legacy of cattle-farming which has left the landscape heavily degraded (Davies 2000; Hudak and Wessman 2001; Bürgi et al. 2017). This, coupled with the elephant [*Loxodonta africana*] population being roughly 400 % above its original anticipated carrying capacity, is percieved to have the potential to severely impact its ecological sustainability (ICS 2006; North West Parks Board 2020; Szott et al. 2020). However, no evidence has been put forward that suggests there is a plan in place to rectify the situation despite the objective data being available to MGR management[1].

Socio-economically, local community members have been seen to have a weakened sense of involvement and benefit accrual in MGR than previously anticipated (Bologna

[1] There is anecdotal evidence that a draft elephant management plan has been created for MGR. However, given that this is not an official report and is not in public circulation, nor intended to be made available for public readership yet, the decision was made to exclude it from this dissertation.

2008). Similar concerns have been raised in other ETBPAs in South Africa (e.g. Fisher et al. 2014; Arbieu et al. 2017), where unfavourable environmental change as a result of historical land-use (such as cattle-farming and other intensive agricultural activities) remains a considerable challenge to ensuring both ecological and economic sustainability (Foster et al. 2003; Bürgi et al. 2017). This is likely to worsen under future climate change events (Rowe 2007; Josefsson et al. 2009; Souza and Longhi 2019). Finally, other ETBPA's are also facing the issue of how to remedy their ever increasing population of charismatic species in such a way that will not negatively impact their ecotourism product in the eyes of wider society (Wylie 2010; Tripathi 2012; Shannon et al. 2013, 2017; Viljoen et al. 2015; Ahmadi et al. 2017; Evans et al. 2018).

The literature has shown that MGR shares a common issue with other ETBPA's. Namely, not being able to balance its 'Triple Bottom Line' interests sufficiently, a challenge that is hindering the efficacy of many ETBPAs on a global scale (Uddhammar and Ghosh 2009; González Fonseca 2012; Mathis and Rose 2016; Shannon et al. 2017; Ghosh and Ghosh 2019; Mnini and Ramoroka 2020). What separates MGR from other ETBPAs is the fact that MGR is particularly isolated from urban areas, causing its main management actors to form part of its on-site community (Davies 2000; Szott et al. 2020). Therefore, the perceptions of OSCMs are more likely to have greater implications in management efficacy. The on-site community of MGR consists of many individuals that have been part of the ETBPA since its inception (Magome et al. 2000; Bologna and Spierenburg 2015; Galvao et al. 2018). This creates a rich longstanding understanding of feedbacks and impacts experienced in the reserve over many years.

Due to its similarities with other ETBPA's in South Africa (i.e., multi-stakeholder partnerships, agriculture land-use legacies, charismatic species' population management and balancing social, economic and ecological interests in ETBPAs), MGR is an ideal case study to investigate management issues faced by similar ETBPAs. However, MGR is also sufficiently unique in its governance intricacies, leaving space to explore how social dynamics in OSCMs can have implications for how management ideals are enacted upon in the system (Galvao et al. 2018). This is demonstrated by the presence of strategic agency whereby, certain groups and individuals within the OSCM are shown to have leveraged their own personal

resources to enact endogenous change in the management of the reserve to maintain the environment and ecotourism functions of MGR (Battilana et al. 2010; Westley et al. 2013; Werbeloff et al. 2016; Kornberger 2017) (as shown in previous research (Galvao et al. 2018)). Institutional entrepreneurship, whereby certain individuals have utilised their strategic agency in the system to better realise personal goals of their own (DiMaggio 1988; Garud et al. 2007; Battilana et al. 2009; Westley et al. 2013), can also be seen to have played a role. This unique dimension allows investigating the effects that OSCM perceptions might have for MGR's sustainability and climate change management decisions both currently and for future trajectories.

This study assumes that (1) management decisions which are (2) implemented into the system create (3) feedbacks which impact the (4) OSCMs who feel these management feedbacks in 'real time'. Because OSCM have a sense of place in the system and 'on the ground' institutional knowledge, their (5) perceptions of management feedbacks could help create resilience in the MGR system if their perceptions are considered in (1) management decisions (Figure 1.2).

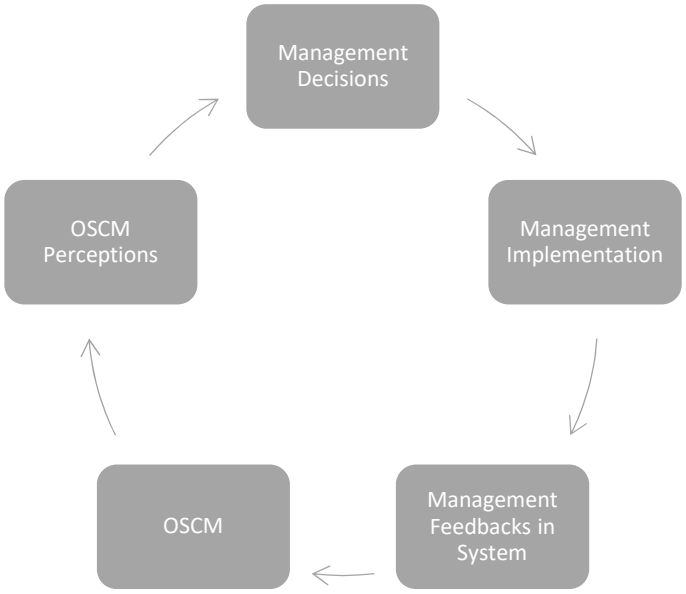


**Figure 1.2:** Assumptions of the feedbacks of top-down management decisions, impacting on-site community members and their perceptions of the system. It is assumed that these perceptions area valuable resources which can be leveraged to create a better bottom--up understanding of the system to assist in creating possible suggestions for top-down management

## 1.3. STRUCTURE OF DISSERTATION

This dissertation is comprised of six chapters. Chapters 3 and 4 are written in paper format. This means that the methods sections are repeated in these sections in far less detail to that of Chapter 2.

Chapter 1- This chapter is an introductory chapter which gives insight into the background of the study, indicates where this study seeks to fill the gaps in the literature, and why it is important, outlines the aim, objectives and research questions of the study and reviews the current academic literature related to the study's main concepts,

Chapter 2- This chapter describes the methodological approach, conceptual framework, data sampling, data collection and data analysis methods of this study, limitations of the study, and researcher positionality. The purpose of this chapter is to allow researchers who wish to undertake a similar study the guidelines to do so.

Chapter 3– This chapter is the first data chapter which illustrates the findings of the first and second objectives of this study and discusses the implications of these findings

Chapter 4- This chapter is the second data chapter which illustrates the findings of the third and fourth objectives of this study and discusses the implications of these findings

Chapter 5– This chapter is a synthesis chapter which highlights the main findings of both data chapters and the suggested next steps for this study.

These chapters are then followed by the Reference List and Appendices

# CHAPTER 2

# METHODOLOGY

## 2.1. STUDY SITE

Covering over 750 km$^2$, Madikwe Game Reserve (MGR) is one of 15 PAs under the control of the North West Parks Board (NWPB) located in the North West Province of South Africa (24.7604° S, 26.2777° E). MGR's northern border runs parallel to the South African border of Botswana with the Marico River being the nearest landmark to its eastern border. Along the Marico River on MGR's eastern border is a blueberry farm 'Madikwe Berry' that was established in 2017 (Madikwe Berry 2022). MGR's southern border is characterised with the Dwarsberg mountain range and Molatedi Dam. MGR's closest town is Zeerust, located 90 kms south of its border. (Hudack and Wessman, 2001) (Figure 2.1).

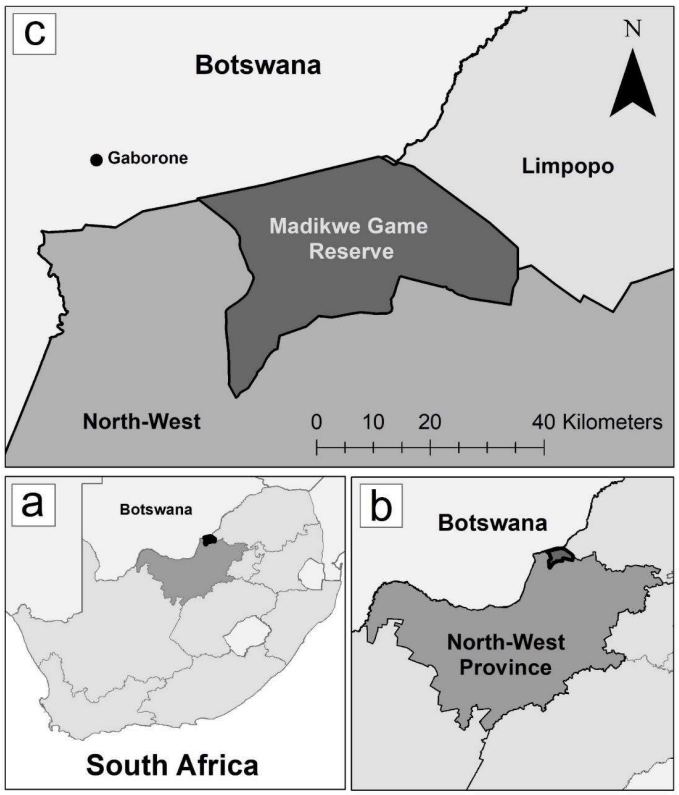


**Figure 2.1:** Map illustrating Madikwe Game Reserve's Location

### 2.1.1. BIOPHYSICAL CONDITIONS

Common to the semi-arid savanna region in which it is located, MGR's biophysical landscape is generally flat with sparse scattered rocky outcrops (Hudak and Wessman 2001). This region receives most of its annual rainfall during the summer season (October to April) and can usually expect to receive and average of 500 mm of rain annually. High temperatures are usually experienced in summer (averaging at 32˚C) and moderate temperatures in winter (averaging at 24˚C) (Viljoen et al. 2014). Mucina and Rutherford (2006) describe three regional variations in geology and resulting vegetation types within MGR: 1) Dwaalboom Thornveld; 2) Madikwe Dolomite Bushveld; 3) Dwarsberg-Swartruggens Mountain Bushveld. The Dwaalboom Thornveld is characterised by ultramafic clay plains with a nearly continuous herbaceous layer which mainly consists of grass species (Mucina and Rutherford 2006; Viljoen et al. 2014). The Madikwe Dolomite Bushveld is characterised by a continuous herbaceous layer mainly consisting of grass species as well as a woody layer which is dominated by deciduous trees (Mucina and Rutherford 2006). The final vegetation type is the Dwarsberg-Swartruggens Mountain Bushveld which consists of various combinations of tree, shrub and dense grass layers (Mucina and Rutherford 2006).

The land-use legacy of MGR is characterised by decades of intensive cattle farming which was halted in 1991 (Hudak 1999). This slow driver on the system has caused land degradation in the form of bush encroachment by sickle bush [*Dichrostachys cinerea*] (Davies 2000; Hudak and Wessman 2001). The land-use change from pastoralism to tourism also altered the landscape's biodiversity composition and density compared to its previous agricultural usage, as several species have been reintroduced into the area (Magome et al. 2000).

MGR is home to 66 large animal species (Sabeta et al. 2018), including highly ecotourism-valued charismatic species known collectively as the 'Magnificent Seven' (African elephants [*Loxodonta africana*], rhino (both black and white, [*Diceros bicornis*] and [*Ceratotherium simum*]), leopards [*Panthera pardus*], lions [*Panthera leo*], buffalo [*Syncerus caffer*]), cheetah [*Acinonyx jubatus*] and wild dogs [*Lycaon pictus*]) (Davies 2000; Sabeta et al. 2018; Szott et al. 2020). There are multiple natural pans and man-made watering holes within MGR (Hudak and Wessman 2001), with some being

maintained by water pumps, providing a continuous water source throughout the reserve for the wildlife (ICS 2006; Szott et al. 2020).

### 2.1.2. SOCIO-ECONOMIC CONDITIONS

According to the Madikwe Development Plan (1997), MGR's main objective is to promote socio-economic development through ecotourism (Madikwe Development Task Team 1997; Davies 2000; ICS 2006; Bologna 2008). Established in 1991, in the then Western Sotho-Tswana (Bophuthatswana) homeland region, MGR encompasses an area of socio-political history relating to the displacement of indigenous and local people to create space for agriculture (initially during the 1800s (Etherington et al. 2009)) and later, ecotourism ventures (Bologna 2008; Etherington et al. 2009; Huffman 2017). The on-site community of MGR consists of lodge staff, some lodge owners and government officials (Davies 2000; Bologna and Spierenburg 2015) There are three main villages which surround and are involved in the management scheme of MGR: Molatedi, Supingstad, and Lekgophung (Bologna 2008). Census (2011) data indicates population sizes for these villages of 1 201 (Molatedia). 2 433 (Supingstad), and 712 (Lekgophung) respectively, but likely these counts are an underestimate given census response rates with the 2022 census currently underway. However, Magome et al. (2000) highlighted that there is conflict between the villages, and this has consequently undermined their ability to work together and participate in management decisions as a collective regarding MGR.

Although post-apartheid reform resulted in successful land claims within MGR by local community members from the villages, the land is still retained within the reserve for conservation purposes. The compensation for this retention is through the government allowing local communities to build, own and run community lodges within the reserve (Bologna 2008; Bologna and Spierenburg 2015; Galvao et al. 2018). Currently, MGR consists of 33 lodges which are either commercial (n=20), corporate (n=9), or community based (n=2) (Galvao et al. 2018; Szott et al. 2020. Each lodge conducts independent game drives in open game-viewing vehicles that can carry up to 10 guests and are driven by qualified field guides (Szott et al. 2020).

The management approach of MGR is a state-private-communal partnership (Szott et al. 2020), whereby the state, North West Parks Board (NWPB), manages the land and wildlife, while the private sector plays the role of attracting and hosting tourists. A

portion of each lodge's revenue goes towards NWPB levies which mainly finances the maintenance of the reserve and supports social development programs in neighbouring villages (Rogerson 2006). The power of local community members to influence management decisions has been placed under question by some authors (i.e., Magome et al. 2000; Bologna 2008), but most of the workforce (over 1000 positions) of the 33 lodges within MGR are filled by local community members (Rhys 2020), although most of these positions are considered to be lower-paid and lower-skilled (Bologna and Spierenburg 2015).

### 2.1.3. CONCEPTUALIZING MADIKWE GAME RESERVE AS A SOCIAL-ECOLOGICAL SYSTEM

Protected Areas are complex adaptive social-ecological systems comprised of multiple interlinked and interdependent components that have non-linear feedbacks (Palomo et al. 2014), Cumming and Allen 2017). Cumming and Allen (2017) conceptualised relationships between different components in social-ecological PAs as direct and indirect influences, outputs, and inputs. Drawing on their work, I conceptualize MGR as such a system (Figure 2.2). MGR is a ETBPA catering to the luxury niche ecotourism market as its main economic function. MGR's major direct outputs include: social development for local communities through job creation; wildlife conservation; and ecosystem service safeguarding. MGR inhabits fauna and flora biodiversity but its most notable species are its charismatic species ('Magnificent 7'- African elephants [*Loxodonta africana*], rhino (both black and white, [*Diceros bicornis*] and [*Ceratotherium simum*]), leopards [*Panthera pardus*], lions [Panthera leo], buffalo [*Syncerus caffer*]), cheetah [*Acinonyx jubatus*] and wild dogs [Lycaon pictus]) (Davies 2000; Sabeta et al. 2018; Szott et al. 2020). Being part of the tourism industry, MGR's experienced direct challenges imposed by COVID-19 regulations which have impacted the tourism market on local and global scales (Spenceley et al. 2021). MGR is also subject to societal views surrounding ecotourism and its management as this ultimately will impact their tourism product (Cumming and Allen 2017).

The most notable indirect influences of MGR are the land-use legacy of MGR which is characterised by decades of intensive cattle farming which was halted in 1991 (Hudak, 1999) (indirect influence of historical trends in land use). This slow driver on the system has caused land degradation in the form of bush encroachment by sickle

bush [*Dichrostachys cinerea*] (Davies, 2000; Hudak and Wessman, 2001). The land-use change from pastoralism to tourism also altered the landscape's biodiversity composition and density compared to its previous agricultural usage, as a number of species have been reintroduced into the area via the direct management plan of 'Operation Phoenix' (Magome et al. 2000). Madikwe Berry is a large commercial blueberry farm that was recently established (2017) on the eastern border of MGR (Madikwe Berry 2022). Although no research has been conducted on the long-term impacts of the blueberry farm on MGR, it is assumed to indirectly, if not directly, influence ecosystem services within MGR (Cumming and Allen 2017).

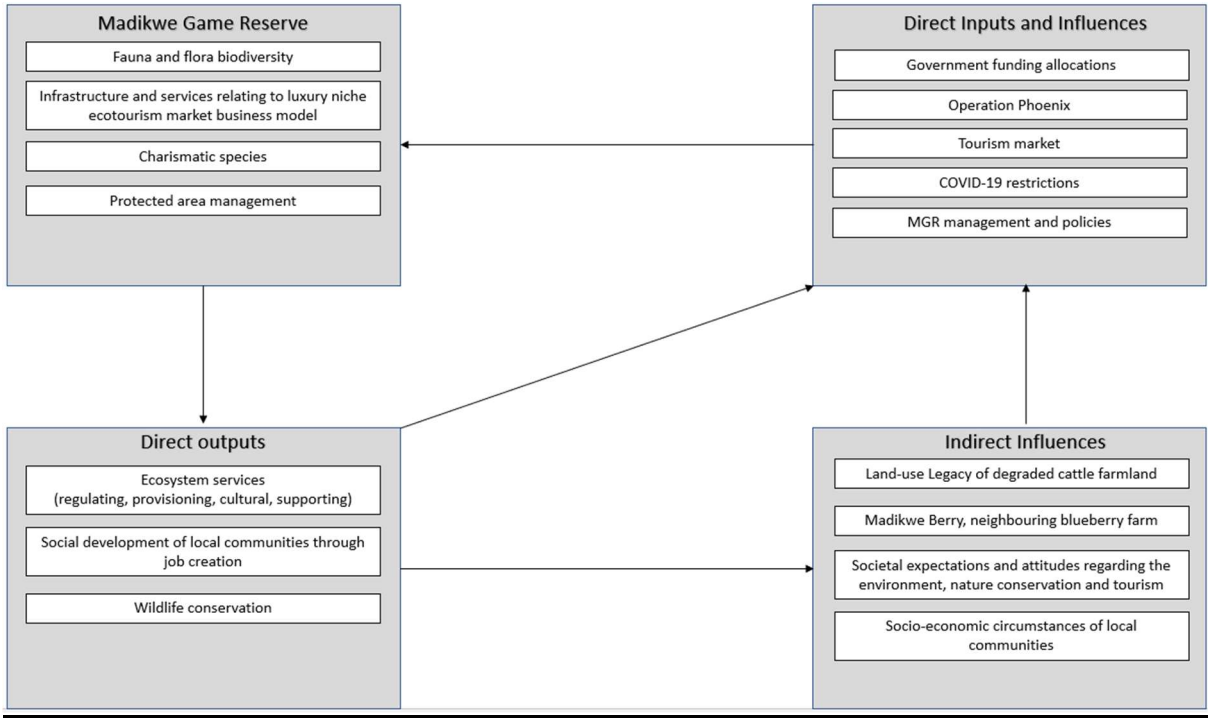


**Figure 2.2**: Conceptualization of MGR as a social-ecological system as per Cumming and Allen (2017)

## 2.2. METHODOLOGICAL APPROACH

This study makes use of a mixed-methods case study research design. The case study research design was chosen as it provides an empirical, exploratory, and in-depth investigation of MGR's social-ecological dynamics and management through the perceptions of its on-site community members (OSCMs) (Crowe et al. 2011; Yin 2017, p. 44). The case study method is non-experimental as it holds no control of events and seeks to explain the contemporary circumstances of the MGR, rather than

trying to prove or disprove a hypothesis through an experimental design that can control the variables being studied (Yin 2017, p. 39). Although a case study approach is designed to understand the contemporary phenomena of a case (like MGR) in-depth, it also provides the opportunity for the research findings to have wider relevance and implications for other similar contexts (ETBPAs) (Yin 2017, p. 34).

The main concept of this research is to gain an in-depth bottom-up understanding of MGR through its on-site community perceptions. Therefore, a qualitative data collection approach was utilised through semi-structured interviews (Palinkas et al. 2015). I then used a mixed methods approach to analyse the raw data of the transcribed interviews. A mixed-method approach involves both qualitative and quantitative methods to data analysis (Berman 2017). The qualitative data collected underwent a qualitative data analysis through thematic coding. The data were then analysed further through quantitative analysis by means of conducting frequency counts of the emerging themes from the thematic analysis. This combination allowed me to gain a better understanding of the system through different interpretations of the data (De Vos et al. 2021; McKim, 2017). An audit trail and additional justification for methodological decisions has been described in Appendix 6.

## 2.3. DATA COLLECTION

Thirty-one in-depth semi-structured interviews (Appendix 1) were conducted over a six-month period by a single researcher (November 2020 - April 2021). Due to the remote location of the reserve and the unreliability of adequate network coverage on-site, interviews were conducted in-person and in line with COVID-19 protocols. Participants were initially purposefully identified through a database compiled in my previous MGR study (Galvao et al. 2018). Initially, I tried to approach longstanding OSCMs who were identified through their participation in my previous study to be interviewed in an attempt to gain a more in-depth understanding of the system's intricate social-ecological interactions over time. This sampling was supplemented by researching publicly available online websites such as each of the lodges' websites and the NWPB official websites where contact details are readily available to expose my study to as many potential participants as possible. Other participants were then identified through snowball sampling based on the recommendations of participants.

Participants were invited to take part in the study via email or WhatsApp. The invitation document provided an Information Sheet (Appendix 2) which detailed: the purpose of the study; the interview process; COVID-19 protocols; the risks and benefits of participation; steps taken to safeguard their anonymity and confidentiality (further explained in Ethical Considerations discussed later in this chapter); and how the data would be used and stored.

Additionally, a consent form (Appendix 3), copy of the semi-structured interview guide (Appendix 1) and copies of the University of Witwatersrand Human Research Ethics Committee (non-medical) ethics clearance certificate (Appendix 4), and the NWPB research permit (Appendix 5) were attached to the invitation to participate.

The semi-structured interviews were used to gain OSCM perceptions of MGR's current management and its implications for MGRs sustainability both currently and for future climate change responses. Semi-structured interviews were used as the data collection tool of this study. This method was ideal as it provided a two-way conversational platform (Rabionet 2011; Hatton MacDonald et al. 2013) giving participants the freedom to elaborate their in-depth perceptions whilst simultaneously giving me the opportunity to guide the discussion to ascertain clarification when responses were thought to be vague (Hatton MacDonald et al. 2013). This conversational setting also allowed participants to feel less restricted by rigid interview structures (Rabionet 2011), allowing them the freedom to share their insights into topics that I might not have previously anticipated, creating a richer dataset (Rabionet 2011; Irvine et al. 2013).

The open-ended interview questions were developed to meet four central objectives of the study, gaining the perceptions surrounding: 1) current management; 2) the current state of the reserve's environmental sustainability and what implications this might hold for the reserve's future trajectory 3) climate change and its interaction within the MGR system and what implications this might hold for the reserve's future trajectories, and 4) OSCM recommendations based on how they would suggest improving the reserve's management (Appendix 1). These categories of questioning are described further below, by objective:

Objective 1:

The initial phase of the interview required participants to describe their perceptions of the current management of MGR. This created a better bottom-up understanding of how MGR management decisions are made, prioritised, and implemented in the system. This further allowed me to uncover where potential areas of management might potentially require more focus to improve MGR's sustainability.

Objective 2

To meet the first objective of this research, at the start of the interview process, participants were asked to identify what first came to mind when they thought were their greatest areas of management concern. Later in the interview process, regardless of if their first answer was ecologically related, participants were asked to identify areas of management concern that were *specifically* related to the ecological sustainability aspect of the reserve to meet the second objective of this research. This created a better bottom-up understanding of MGR's ecological management priorities and areas of concern that may require more focus. This understanding of MGR's current ecological system acted as a precursor to understanding how the system might fair when faced with climate change impacts.

Objective 3

The third phase of the interview required participants to explain their understanding of climate change, if they thought that climate change has impacted the MGR system in the past, how they perceived current climate change management in the reserve and to identify what their concerns were regarding climate change management in the future. This created a better bottom-up understanding of how climate change is understood and managed in the system. This understanding can identify certain areas of concern that require more management focus to increase MGR's resilience and sustainability both currently and in the future

Objective 4

The final phase of the interview was aimed at understanding the values and priorities of different stakeholders of the reserve by offering them the opportunity to provide recommendations to improve MGR management both in general and relating to improving climate change management responses specifically. This also provided

insights into the roles that values play in making, prioritising, and implementing management decisions in the reserve.

## 2.4. DATA ANALYSIS

Once the interviews had been conducted, interview recordings were then transcribed verbatim. Participants who requested to check their transcripts which were emailed to them and given a period of five days in which to respond with any concerns.

Although a mixed-methods approach was utilised to analyse the data (Pluye and Hong 2014; Palinkas et al. 2015), this study mostly used qualitative analysis (through thematic analysis) of the qualitative data (through interview transcripts) and a limited quantitative analysis (frequency counts of emerging themes from the thematic analysis process) to support the qualitative findings (McKim 2017). The data sets were mainly analysed following the six-phase thematic analysis method as proposed by Braun and Clarke (2006) (Table 2.1). Following the recommendations of Nowell et al. (2017), this method was conducted as a reflective process that moved between phases depending on how findings emerged through the data analysis process over time.

**Table 2.1:** Table of Braun and Clarke's (2006) proposed six-phase thematic analysis method (Braun and Clarke, 2006, p87)

| Phase | Description of the process |
|---|---|
| 1. Familiarizing yourself with your data: | Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas. |
| 2. Generating initial codes: | Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code. |
| 3. Searching for themes: | Collating codes into potential themes, gathering all data relevant to each potential theme. |
| 4. Reviewing themes: | Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis. |
| 5. Defining and naming themes: | Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, |

| | |
|---|---|
| | generating clear definitions and names for each theme. |
| 6. Producing the report | The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis. |

### 2.4.1 THEMATIC ANALYSIS

The thematic analysis method was chosen for this study as it is widely used as a flexible foundational method for conducting qualitative analysis (Nowell et al 2017). This method is useful in examining similarities, differences and unexpected insights of participant perceptions (Braun and Clarke 2006) which is necessary to meet the research questions of this study.

The first phase involved familiarizing myself with the data by reading through the transcripts three times (Braun and Clarke 2006). During this phase, I noted interesting points raised and potential patterns shown throughout the data. I then used these notes to assist in generating initial codes for phase two (Nowell et al. 2017).

During this thematic analysis period, it was noted that participants would refer to the same group of people by slightly different names. To make the data capturing process more efficient, one group name was selected and recorded in all transcripts for analysis efficiency purposes, for example:

a. Northwest Parks Board/Government/Parks Board/etc. was referred to as: ‘NWPB’

b. Madikwe Futures Company/ Futures Company/ Private Investors/ Concessionaires Forum/ Concessionaires/etc. was referred to as: MFC

c. Honorary Officers/HO’s/etc. were referred to as: HO’s

d. Madikwe/Madikwe Game Reserve/ the reserve/the park/ etc. was referred to as: ‘the reserve’

During the second phase, the transcripts were uploaded onto the RQDA programme in RStudio. RStudio was chosen because it is free, open-source, and a user-friendly capabilities to assist in working efficiently with large amounts of text (King 2004; RStudio Team 2016). Each transcript was coded according to the notes made during the in phase one and further emerging codes of interest were recorded.

The third phase involved reflecting on the initial codes and identifying emerging themes from the data. Themes were formed to capture significant concepts throughout the data and noting where they might link up to the research questions posed by this study.

The fourth analysis phase involved reflecting on and refining themes. Themes that were too diverse, did not have enough evidence to support them, or did not align with research questions were recoded or combined according to broader categories (King 2004; Nowell et al. 2017). During this phase, it was found that some concepts needed to be recoded to create a more coherent link between themes.

There were also instances of ‘undertones’ within the data whereby concepts were alluded to but not elaborated on or made directly apparent during interviews (Mullings 1999; Irvine et al. 2013). For example, ‘undertones’ were particularly noted when people touched on potentially sensitive and controversial topics such as funding or elephant management. During this time concepts of corruption and political tension were alluded to by the way participants described the issue but did not state their concerns outright.

I observed a common trend amongst most participants to be very cautious and not forthcoming with information perceived to be sensitive at first. As the participants became more comfortable during the interview process, they gave more information relating to their perceived area of concern in other questions of the interview.

Under further reflection, data were also re-coded during this phase to capture undertones of strategic agency and institutional entrepreneurship (DiMaggio 1988; Westley et al. 2013) in the management structure. These undertones were identified through the way some OSCMs were described as leveraging their resources such as their institutional knowledge or financial resources to enact endogenous change in the management of the reserve to maintain key ecotourism and conservation functions in MGR (DiMaggio 1988; Battilana et al. 2010; Werbeloff et al. 2016).

Overarching themes were created to encompass underlying themes that shared similar undertones. For example: the overarching theme of ‘inadequately filled positions’ was created to encompass themes relating to official positions within the management structure of MGR that are either vacant or filled by people who are perceived to have differing skill sets and abilities compared to those that the position typically requires.

In line with the thematic analysis process recommended by Braun and Clarke (2006), the fifth analysis phase is generally one which involves the consultation and debriefing between multiple researchers (working on the same dataset) regarding how each theme fits in the overall portrayal of the data to meet the research objectives. However, this data analysis process was conducted by a single researcher. Therefore, I consulted with my supervisors on a regular basis to assist with reflecting on the emerging themes as a whole to create a more coherent pattern for storytelling purposes.

In an addition to Braun and Clarke’s (2006) six-phase method, themes were categorised to meet the different research questions of this study and then underwent a quantitative analysis phase consisting of frequency counts.

#### 2.4.1.1. *QUANTITATIVE ANALYSIS TO SUPPORT THEMATIC ANALYSIS*

The quantitative analysis of theme frequencies was not a major focus as the frequency of themes did not necessarily relate to their importance, particularly when it came to ‘undertone’ themes. Rather, frequencies were used to illustrate the patterns of themes to support the qualitative findings via bar graphs (Johnson and Onwuegbuzie 2004; Pluye and Hong 2014).

#### 2.4.1.2. *MENTAL MODELS TO SUPPORT THEMATIC ANALYSIS*

Based on the synthesis of the interview data, I created mental model diagrams as a cognitive representation of the components, impacts and feedback in the system (Ban et al. 2013; Moreno et al. 2014). These components and their interactions were then described in-text with corresponding numbers (example: [1]) to establish a more in-depth explanation of these relationships (Lynam and Brown 2012), in accordance with phase six.

The sixth analysis phase involved the final analysis and write up of the findings (Braun and Clarke 2006). Following the recommendations of King (2004), direct quotes and paraphrased quotes from participants were used to enhance the narrative of the findings by demonstrating the prevalence of certain themes (King 2004). This was done to assist in understanding the richness and depth of the data. Information given through quotes is indicated by “P” in brackets, for “Participant” followed by the number allocated to that quote (for example: (P1)). Participant numbers were randomised to avoid deductive disclosure in accordance with ethical considerations described below

The findings are then discussed to identify patterns, link up the interpretations of the data to other studies and highlight what wider implications these findings might have for ETBPA management. I also made the decision to refer to MGR as ‘the reserve’ in my discussion to maintain consistency but did not alter quotes that referred to it as ‘the park’; ‘Madikwe’; ‘the game reserve’ in an attempt illustrate the idea that MGR is perceived differently by participants throughout the discussion.

## 2.5. ETHICAL CONSIDERATIONS

This research study received ethical clearance from the University of Witwatersrand Human Research Ethics Committee (non-medical) (H20/07/11) and was considered as minimal risk (Appendix 4). A permission permit was also granted by the NWPB to conduct studies within MGR (Appendix 5).

It emerged in a previous study conducted in MGR that the on-site community of the reserve is, by nature, relatively small and tightly knit with most individuals personally known by one another. This poses a potential risk of participants being identified through quotes based on how they speak (Kaiser 2009). Participants were made aware that this was a risk associated with participating in this study, albeit minimal. When first invited to participate in the study, participants were made aware of the following ethical considerations that had been implemented:

- Although recorded in the interview to meet previous objectives, no personal identifiers (such as names, relations, job titles (both current and previous), etc.) were used in the write up of the study.
- Participants were given the option to check their transcripts and were granted the opportunity to either retract information given in the interview or highlight a

section of the interview where they were comfortable with the information being used but would prefer for it to be paraphrased instead of quoted. This was done as an extra safety procedure to avoid deductive disclosure whereby participants would be more aware of how their personal phrasing would be recognised by the wider community compared to a third-party researcher.

- Quotes from all interviews that were considered useful to the research narrative had all personal identifiers removed or paraphrased and were placed into a single excel spreadsheet. These were then allocated a random participant number from 1-31 (i.e. (P4)). This was done to alleviate the risk of deductive disclosure and to prevent any unintended bias from the researcher to favour any particular participant responses.
- Participants were made aware that the raw data would only be seen by the researcher and her supervisory team. Any requests for data for the purposes of follow up studies would be granted only for data cleaned of all personal identifiers and upon additional ethical clearance. The data are stored on a password secured laptop and Google Drive only accessible to the researcher and her supervisory team.

The semi-structured interview guide was attached to the invitation document, giving participants the opportunity to prepare answers, ask for clarity on any questions and to be given the opportunity to identify what questions they were not comfortable answering during the interview.

A link to an online consent form (created using Google Forms) was attached at the end of the invitation document (Appendix 3- consent form). The online consent form, in which participants acknowledged they understood all factors involved in the study, was signed before interviews were conducted. These factors included: the purpose, benefits and risks associated with participating in the study; COVID-19 protocols that would be observed; and the timeframe in which they were permitted to withdraw within a seven-day period. The consent form also provided the option to have the interview recorded and to have their interview transcript sent back to them to insure they are comfortable with the information they have provided to be used in the study.

## 2.6. RESEARCHER POSITIONALITY

I was known to some participants via family involvement in the reserve. I am a young, unmarried woman who was the grandchild of a couple who built and owned one of the lodges within the reserve. My grandfather, who was involved in some concessionaire works when MGR was in its infancy, passed away in 2012. My grandmother, who was never actively involved in any of MGR's management or social events, passed away in 2019. My remaining family and I have no active involvement or influence in Madikwe society. The lodge remained in the family but was only utilised for family holiday visits. Ethical clearance was granted knowing this positionality and was not deemed as an additional risk factor.

## 2.7. LIMITATIONS

This research study was conducted in unprecedented times due to the outbreak of COVID-19 resulting in several unintended delays in the research process. During lockdown levels 5 to 3 in South Africa, MGR was closed to the public, as were its government offices. This caused serious delays in acquiring research permits for the reserve and access to the reserve to conduct interviews. Interviews had to be conducted in-person as MGR is notorious for unreliable network coverage, making online interviews impossible.

Interviews were also delayed until the reserve re-opened to the public. Another repercussion was the number of potential participants decreased, especially the more long-standing elderly individuals for fear of contracting COVID-19 despite the necessary protocols being put into place. These protocols, which were explained to participants prior to interviews, included: Interviews being conducted outdoors, with both parties required to wear masks, utilize sanitizer, and being seated at least 2 meters away in line with social-distancing protocols. I was also delayed twice due to my household being severely infected with COVID19. Furthermore, major delays occurred due to severe flooding which left many of the roads within MGR closed for multiple days, causing travelling delays within the reserve.

Although efforts were made using all publicly available information to invite on-site community members, only 31 participants agreed to be interviewed. Some potential participants cited fear of job and social security through deductive disclosure as reason

for refusal, despite knowing the measures being taken to avoid such risks. Others were uncertain as to whether I was legitimate in my claim that I was a university student, stating that they were of the opinion that I worked for the government. Another reason given was some individuals felt they did not have the right amount of knowledge to answer the questions posed in the semi-structured interview guides while the rest did not respond to the invitation.

While every effort was made to be as representative as possible in conducting this study, the results may not be completely comprehensive, and not all stakeholder views may be equally represented. Unfortunately, the actual stakeholder representation could not be reported in this study due to the ethical implications of deductive disclosure based on the sample size of the data. It is noted that although the sample size may be relatively small compared to the OSCM population of MGR, this is a qualitative study aimed at gaining in-depth insights into the system. Thus, the decision was made to opt for depth over breadth of information representation.

The limitations of the six-phase analysis method as recommended by Braun and Clarke (2006) do not provide a linguistic analysis of language use. This could be useful in identifying value orientations, for example of the respondents. A further limitation of the method structure is found in its advantage of being flexible as this flexible analysis may create inconsistencies when developing themes from the data (Braun and Clarke 2006; Nowell et al. 2017). The limitations posed by the logistics and academic requirements of this study were that I was the only researcher who analysed the data using the six-phase analysis method as recommended by Braun and Clarke (2006). Therefore, the data were unable to undergo processes such as researcher debriefing and double-blind coding. As a result, the data was only analysed from my own perspective. However, I was in regular consultation with my supervisors who assisted me when I was unsure of how to portray the data to get a different point of view for analysis.

# CHAPTER 3

# PERCEPTIONS SURROUNDING MADIKWE GAME RESERVE'S CURRENT MANAGEMENT

## 3.1. INTRODUCTION

The trade-offs between maximizing short term ecotourism and ecological benefits of ecotourism based protected areas (ETBPAs) have major implications for its sustainability (Belsoy and Korir 2012; Dologlou and Katsoni 2016). However, identifying different perceptions of how and why these trade-offs are considered can potentially aid in providing holistic management suggestions and solutions formed through multiple knowledge bases (Tengö et al. 2014; Agyeman 2014; Dam Lam et al. 2019). The on-site community of ETBPAs hold a diversity of knowledge, values, and perceptions regarding the social-ecological system that they form part of (Tengö et al. 2014; Armatas et al. 2016; Dam Lam et al. 2019). This diverse bottom-up understanding of the system is an underutilised resource that can be useful in identifying 'real-time' management impacts experienced by on-site community members (OSCMs) in the ETBPA (Múnera and van Kerkhoff 2019; Dam Lam et al. 2019). This can assist in identifying possible areas that require more focus from management to improve the overall resilience and sustainability of the ETBPA.

The on-site community of Madikwe Game Reserve (MGR) consists of many individuals that have been part of the ETBPA since its inception (Magome et al. 2000; Bologna and Spierenburg 2015; Galvao et al. 2018). This creates a rich longstanding understanding of feedbacks and impacts experienced in the reserve over many years. I argue that harnessing these valuable insights of how the system is currently managed can help identify what values are potentially being prioritised in the system through its management decisions. MGR is used as a case study to understand the potential implications for improving an ETBPA's management efficacy in ensuring the protected area's PA's sustainability, resilience, and longevity through system-tailored suggestions. Therefore, this chapter of the study aims to capture the bottom-up understanding of Madikwe Game Reserve's (MGR's) social-ecological system to provide system-tailored suggestions through the objectives of:

(1) Identifying OSCM perceptions of current areas of management concern and;
(2) Identifying perceptions of current areas of management concern that specifically surround the ecological sustainability of MGR.

## 3.2. METHODS

The data for this chapter were obtained through in-person interviews of n=31 MGR OSCMs. The data then underwent both qualitative and quantitative analysis in line with the process described in the methodology above (Chapter 2). The data were qualitatively analysed through thematic analysis where it underwent thematic coding. Following this the main themes were identified and analysed following the six-phase thematic analysis method as recommended by Braun and Clarke (2006).

In addition to thematic analysis, emerging themes were categorised in line with the different research questions posed by this study. Frequency counts were conducted on the emerging themes and tabulated to provide a quantitative aspect to the data analysis (Pluye and Hong 2014). Once the data had been analysed, a synthesis of the findings was illustrated through a systems diagram to better understand prevalent components in the system and the relationships between them (Lane 2000).

## 3.3. RESULTS

### 3.3.1 PERCEIVED AREAS OF MADIKWE GAME RESERVE'S CURRENT MANAGEMENT CONCERNS (OBJECTIVE 1)

Participants identified a total of 34 themes associated with current management concern. The frequency counts of these themes help to understand patterns. Themes in this sense generally related to full quotes and not necessarily the count of single words/phrases. It is noted that the frequencies depicted in the results relate to the number of times a particular topic was brought up by all participants. For example: If 23 participants mentioned that the topic of elephant overpopulation was an issue 'elephant overpopulation' was counted 23 times. Therefore, if 'elephant overpopulation' was mentioned 41 times by one participant, the topic would still only be counted as one. . However, it is noted that some themes may have received a low frequency count but account for a prominent 'undertone' linking other themes together.

For example: ‘resource distribution’ (n=1; 0.61%); corruption (n=1; 0.61%); and political tension (n=1; 0.61%) which will be discussed in more detail below.

Major themes fall into four broad categories. These broad categories, which will be looked at in more detail, include:

- **Governance Inefficiency** consists of 10 themes that account for 32.31% (n=53) of the total frequency count of the data in this chapter relating to objective 1 (n=164). Themes categorised under ‘governance inefficiency’ relate to perceived prevalent issues surrounding: Park finances, resource distribution, unclear management structure, social development in management, decision-making and administrative processes, and infrastructure maintenance.
- **Socio-Political Issues** consists of eight themes that account for 26.33% (n=43) of the total frequency count of the data in this chapter relating to objective 1 (n=164). Themes categorised under ‘Socio-Political Issues’ relate to prevalent issues surrounding: Management transparency and communication; management cohesion; ‘North-East versus South-West’ political divide; mentorship and political tension.
- **Safeguarding The Ecotourism Product** consists of seven themes that account for 8.54% (n=14) of the total frequency count of the data in this chapter relating to objective 1 (n=164). Themes categorised under ‘safeguarding the ecotourism product’ relate to issues surrounding: improving game-driving etiquette, COVID-19, eco-friendly lodges, and lodge saturation in the reserve.
- **Ecological Management** consists of eight themes that account for 32.31% of the total frequency count for the data chapter relating to objective 1 (n=164). However, although ‘Ecological Management’ is one of the largest categories in this data chapter, this category will be placed last in reporting the findings of objective 1 (Identifying OSCM perceptions of current areas of management concern) as it interlinks with the findings of objective 2 (Identifying perceptions of current areas of management concern that specifically surround the ecological sustainability of MGR). For data relating to objective 2, 14 themes were identified with a total frequency count of 67. Themes categorised under ‘Ecological Management’ relate to issues surrounding: Elephant overpopulation, sickle bush encroachment, land degradation rhino poaching, infrastructure maintenance, the need for a qualified ecologist, and others.

### 3.3.1.1. *GOVERNANCE INEFFICIENCY*

The 'Governance Inefficiency' is the largest area of management concern category. It consists of 11 themes that account for 34.76% (n=57) of the total frequency count of the data in this chapter (n=164). This section explains themes categorised under 'governance inefficiency' which relate to perceived prevalent issues surrounding: Park finances (n=14; 8.54%), resource distribution (n=1; 0.61%); unclear management structure (n=3; 1.83%); social development in management (n=2; 1.22%), decision-making (n=9; 5.49%) and administrative (n=3; 1.83%) processes, and infrastructure maintenance (n=7; 4.27%) (Figure 3.1).

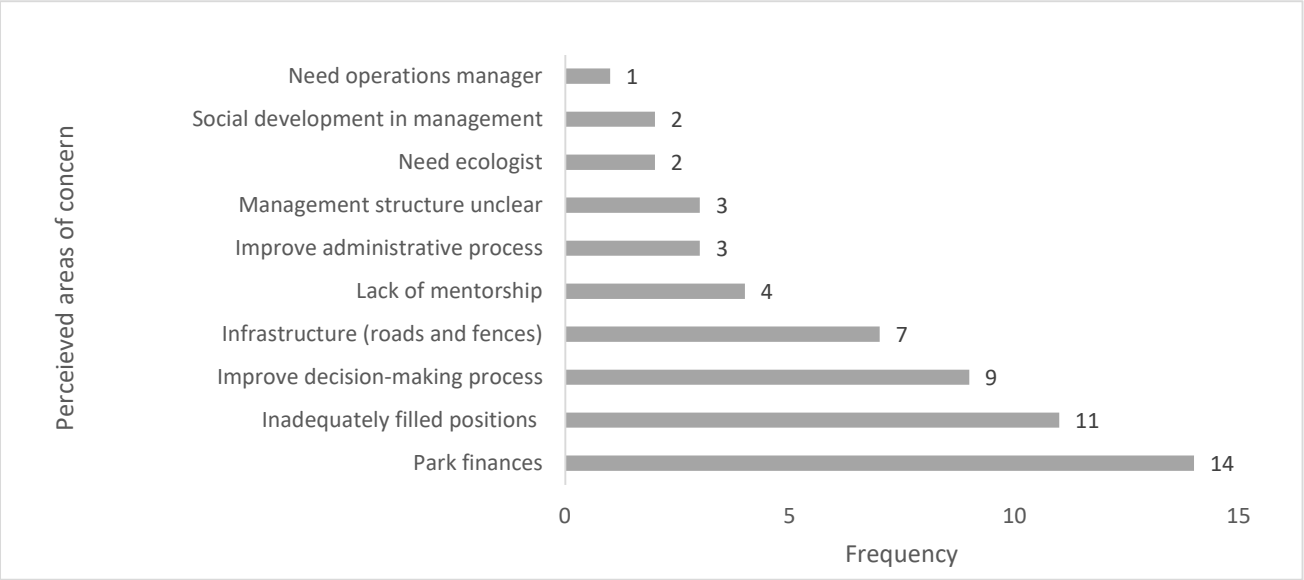


**Figure 3.1:** Frequencies (n=57) of 11 themes relating to areas of management concern within the category of 'governance inefficiency' as identified by 31 participants

#### 3.3.1.1.1. ***PARK FINANCES***

Park Finances (n=14) has most frequently perceived as an area of current management concern (26.42%) under the category of Governance Inefficiency (n=53) and second overall in terms of all categories (8.54%). According to the data of this study, MGR is supposed to be funded by North West Parks Board (NWPB) as the "landlords" from whom the investors lease land on which they run their lodges (P2).

Therefore, the general perception is that NWPB is responsible for providing funding for the day-to-day running of the reserve including infrastructure maintenance, administration, and ecological maintenance of the reserve (P8, P14). However, according to the OSCMs:

*"Funding is always an issue with everything"* (P9)

There have been previous attempts to remedy NWPB's financial constraints through buffalo auctions. However, these auctions stopped due to a Bovine Tuberculosis outbreak in 2012 (P17). Participants indicate that NWPB pools the funds received by all 15 of the PAs that they manage in the North West Province. Pilanesberg National Park and MGR are the two largest financiers under NWPB's PA collective which has been perceived to contribute to their financial issues, as the money that is produced by MGR.

"*[Money made by Madikwe] is not put back into the game reserve"* (P4)

but rather used to support smaller reserves. This pooling strategy is not favoured by any of the participants who claim, "*that is not justice …you need to protect your interests and your best product, the product that sells the most - you need to make sure that it is in a good state, that it is well looked after*" (P7).

There is the perception that NWPB "*Probably have run out of money*" (P12) which has caused the Madikwe Futures Company (MFC) to have to fill this gap. This has been attempted primarily through finding self-funding alternative capital injections from conservation levies, gate fees, and other fundraising projects like rhino notching as well as donations to the Madikwe Game Reserve Conservation Fund.

#### 3.3.1.1.2. ***INEFFECTIVE RESOURCE DISTRIBUTION***

Ineffective resource distribution within the reserve was explicitly indicated by one participant (n=1; 0.61%) as an area of current management concern. However, several other issues were raised which were implicitly linked by the undertone of 'inefficient resource distribution'. These include issues such as those relating to: Finances (n=14; 8.54%), North-East versus South-West political divide (n= 9; 5.49%); Corruption (n=1; 0.61%); Inadequately filled positions (n=11; 6.71%), and maintenance of infrastructure such as roads and fences (n=7; 4.27%).

This is evident in the response by P4 who claimed resources are "*not being applied 100%"* (P4). A lack of equipment and workforce are an ongoing concern, particularly for infrastructure maintenance around MGR. For example: *"you have one machine with a lot of places to prioritise and when it rains you can't risk putting the machine in there because then the machine gets stuck and then you sit there for 1 week, two weeks to a month without a machine*" (P19).

Ineffective resource distribution is attributed to an unbalance in power relations within the reserve (P12), with some individuals having *"a big say where funding gets directed*" (P6) and *"that direction is often for the benefit of the whole reserve" (P22).* Some of the resource distribution comments related to a perceived "North-East versus South-West" (n=9; 5.49%) geographical political divide which will be investigated further in the socio-political issues category.

#### 3.3.1.1.3. ***INADEQUATELY FILLED POSITIONS***

*"The reserve is struggling with their management and positions that haven't been refilled"* (P11).

Through my synthesis of the data, 'inadequately filled positions' defines positions within MGR's management structure which are either vacant or filled by people who are perceived to have differing skill sets and abilities compared to those that the position typically requires.

Although the general notion of inadequately filled positions constitutes 6,7% of the overall perceived areas of current management concern (n=11), the positions of ecologist (n=2; 1.22%), and operations manager (n=1; 0.61%) are specifically mentioned as urgent staffing needs. These positions are seen as key roles that are necessary for the reserve to operate efficiently. However, MGR has been without these roles for almost 8 years (P7). "*A position needs to be vacant for three years before it is considered redundant [in NWPB]"* (P31). There is a lack of clarity as to how the reserve can be allowed to function without these key roles, *"especially because of the unemployment figures in South Africa, you would think that every government position would be filled with people"* (P4).

Some participants speculated that this is due to political issues rather than staffing availability, "*Once the ecologist and operations manager left, no one was appointed to*

*replace them. It's quite embarrassing to say that a big park like this doesn't have an ecologist… how can an ecologist be irrelevant?*" (P7).

The inadequately filled positions reveal a strategic agency component in the MGR management structure. Some individuals are taking on additional tasks not necessarily related to their professional role which they are employed and paid to do to assist in maintaining the reserve in an unpaid volunteer-based capacity (P19). The main two groups of individuals showing acts of strategic agency are the HOs and MFC. Although some are *"valiantly taking on multiple [management] roles"* (P22) and responsibilities, ineffective resource distribution specifically relating to the lack of funding, personnel and expertise still hinder management efficiency (P22).

Similarly, although the good intentions of these individuals are commended by other OSCMs, there is still consensus among the group that this should not be necessary - "*It is great that all of these people go above and beyond but they shouldn't have to. It is not their job to do that. Someone is or should be employed to do those jobs already"* (P24).

The MGR counter-poaching unit was identified as an example of this: "*There are not nearly enough government staff working in the reserve with the know-how and the equipment that is needed to keep the poachers out and to keep the place safe. So once again, it falls to the MFC"* (P1) which has staffed and equipped the operations surveillance department to assist the counter-poaching unit.

The strategic agency, albeit with its "*good intentions"* (P27) and perceived necessity, is seemingly creating an ad hoc management approach. "*The reserve is trying to survive on a day-to-day basis rather than forward planning and trying to do preventative management. They're not planning for the future…they take it day by day rather than having a game plan*" (P22).

The management approach has also been called "*more reactive"* (P6) functioning in the hopes that by reacting to things as they happen "*you move around the problems that might appear later on"* (P5). The reactive, ad hoc management, combined with strategic agency creates a knock-on effect resulting in a lack of clarity (n=3; 1,83 %) as to what the actual management structure is or ought to be. Some are looking at the management structure more subjectively than objectively, attributing the functioning of the reserve to "*a bunch of people that are trying to help a better cause and you just*

*hope that that cause fits in with your management going up and down*". There is, however, a sense of hesitation and reluctance to radically alter the current way of 'doing things', because *"it is working*" (P5).

### 3.3.1.1.4. ***UNCLEAR MANAGEMENT STRUCTURE***

Unclear management structure (n=3) accounted for 1.83% of the total frequencies of management concerns in the data. However, this was a major undertone of 'inadequately filled management positions' (n=11; 6.7%). During my data analysis, I discovered that inadequately filled positions had caused the current ad hoc management structure of MGR to look different to the perceived 'ideal' management structure. Following these discoveries, I created an organizational structure to synthesise participant perceptions of the current on-site management structure of the reserve (Figure 3.2). I have indicated how these roles are perceived by the numbers in the illustration corresponding to their explanations in the text below (example: [1]).

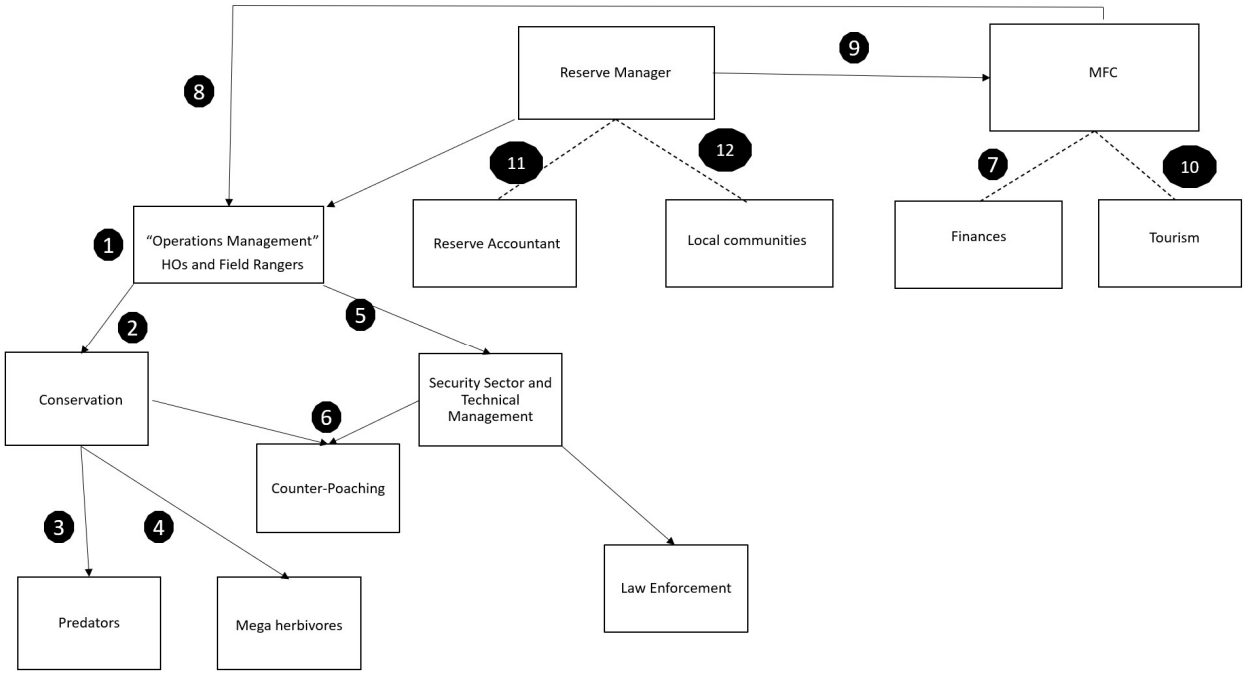


**Figure 3.2:** A synthesis of 31 participant perceptions of the current management structure of Madikwe Game Reserve. The numbers correspond to explanations in the text below (example: [1])

One interviewee characterised the current ad hoc on-site management structure of the reserve as "*shocking"* and *"seriously overcomplicated"* (P29). The management structure is described as 'intertwined' (P31) with multiple people coming together in the hopes that everyone is working towards a common goal (P31).

However, there are perceptions that MGR is not "*very well run, in terms of structure and actually getting things done"* (P28). There is a lack of clarity and communication mainly relating to the roles, rights and responsibilities of the hybrid institutions formed out of strategic agency, mainly those concerning honorary officers (HOs) and the MFC. Furthermore, there are issues concerning the legislative placing of HOs. Participants raised concerns that the rules, rights and responsibilities of HOs are not made clear to the on-site community at large. Making it very difficult to determine how "*to interact with them from a legal standpoint"* (P4).

> *"I understand that the park uses these people because they have been in the park for a long time and they have experience from being in the park for a long time within certain departments, but where do they actually fit? Nothing is aligned."* (P23).

HOs fulfil multiple roles, usually as "*a supporting unit*" (P9) to the Operations Manager and their supporting roles. Under 'ideal' circumstances, HOsact as supporting units to field rangers (P31). However, the perceived increase in administrative power creates a multi-faceted structure within the HO group like that of the Operations Manager in an 'ideal' management structure and its supporting roles [1] (P22). Similarly, the role of Ecologist falls largely to the same group of HOs. This group's passion for and knowledge of wildlife (P11) is said to greatly assist in "*naturally filling the ecologist gap"* (P1), often at the expense of their personal income (P11). This passion and place attachment has been attributed to the success of the reserve despite lacking key government roles. However, Participant 30 highlights that this passion may potentially be the HO's "*biggest downfall"* because they "*are quite passionate and passion sometimes gets in the way when we really need to get something done*".

There is unanimous agreement amongst participants that a role filling the gap of an ecologist in an 'ideal' structure is headed by two main individuals who are supported by an off-site vet and researcher [2]. These two individuals mainly focus on predators [3] and megaherbivores [4] respectively. There was no mention of a similar dedication

to overall landscape management or to managing general game and other wildlife species that are not considered 'charismatic'. The HO reporting line for ecological work is perceived to extend through the Reserve Manager, ending with the off-site NWPB Chief Conservation Officer (P24). The Security and Technical Manager roles [5] are also filled by HO's and some government officials. The security sector and megaherbivore management groups work closely together under the combined-priority goal of counter-poaching [6], particularly that of rhinos (P27).

Although the HOs do not report to the MFC directly, there is the perception that they work in collaboration as the MFC funds [7] most of the HO work [8]. *"It is almost as if the MFC is having to tell the government what to and where to go because the government does not have the necessary equipment to do the job*". The MFC works closely with the Reserve Manager [9] in order to sign off on all activity that they wish to fund in the reserve to ensure that it is all "*above-board*" (P2). This is also perceived to inadvertently remove the need for a Tourism Manager [10], since the MFC represents all of the lodges within MGR and hosts Concessionaire Meetings as the chairperson of the MFC is in frequent contact with the Reserve Manager (P30). The Reserve Manager is seen to enact duties relating to the Reserve Accountant [11] and monitors issues surrounding local communities [12] (P31).

Although it has been identified as a key on-site management role, participants did not indicate whether the role of Community Liaison is being actively attended to. However, some lodges have been noted to have their own community development programs and initiatives, but they are not government mandated or monitored (P4).

Although the primary objective of MGR was to increase socio-economic development for local communities (Madikwe Development Task Team 1997; ICS 2006; Bologna 2008), the community leg of the '3-legged pot' management structure has been perceived by participants as failing in terms of giving equal share of voice to the local community. Despite the community playing a vital role in the system, the government and private investor legs are perceived to have a greater share of management influence (P10). Participant 26 highlights the implications of undervaluing the importance of local communities - "*If you are not benefiting your community by having the protected area, the extent of what impact they can have on that protected area could be massive*".

Figure 3.2 above illustrates the synthesis of how participants perceive the current management structure of MGR. However, the diagram below is a synthesis of how participants perceive the 'ideal' management structure (Figure 3.3). It is apparent that there is a stark contrast between the 'ideal' and current management structures which highlight the current concerns surrounding management complexity, lack of transparency and inadequately filled positions. This diagram is accompanied by a table describing what duties each role is seen to be ideally responsible for (Table 3.1).

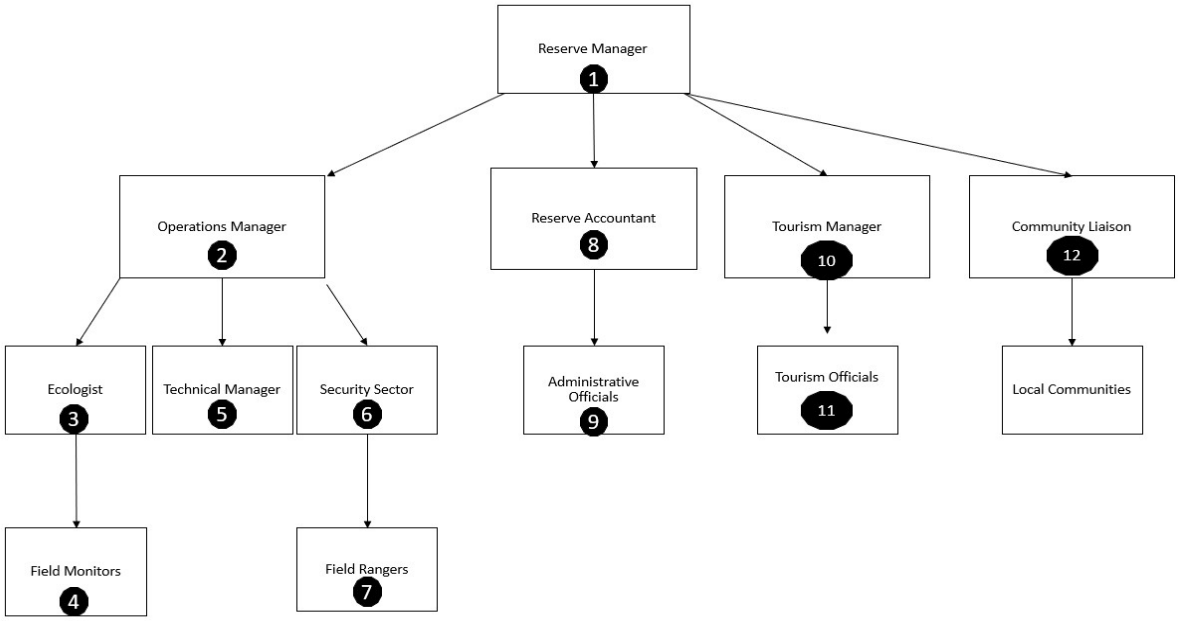


**Figure 3.3:** A synthesis of 31 participant perceptions of the 'Ideal' management structure of Madikwe Game Reserve. The numbers correlate to a description of each management position's duties in Table 3.1

**Table 3.1:** ' Ideal' positions in Madikwe Game Reserve's management structure and the perceived duties relating to them

| Number on Diagram | 'Ideal' Position | Duties<br>(Which include but are not limited to) |
|---|---|---|
| 1 | Reserve Manager | • Liaison between concessionaires, on-site and off-site management<br>• Oversee:<br>o Operations Manager<br>o Reserve Accountant<br>o Community Liaison<br>o Tourism Manager |
| 2 | Operations Manager | • Oversee general operations and maintenance of MGR involving:<br>o Infrastructure<br>o Security<br>o Ecology |
| 3 | Ecologist | • Manage various aspects of maintaining the ecological integrity of the landscape<br>• Ensure optimum conditions for 'Magnificent Seven' game-viewing. |
| 4 | Field Monitors | • Supporting unit for Ecologist<br>• Monitoring day-to-day landscape and wildlife activity. |
| 5 | Technical manager | • Management of technical issues of infrastructure, equipment, etc. |

| | | |
|---|---|---|
| 6 | Security Sector | • Headed by Reserve Ranger<br>• Law enforcement<br>• Rhino Counter-Poaching Unit |
| 7 | Field Ranger | • Supporting unit for Security Sector<br>• Area patrol<br>• Monitor for criminal activity |
| 8 | Reserve Accountant | • Managing MGR finances<br>• Budgets and procurements in line with the Public Finance Management Act 1 of 1999<br>• Fulfilling MGR requirements to run as a Section 21 company under the Companies Act 61 f 1973 |
| 9 | Administration Officials | • Supporting unit for Reserve Accountant |
| 10 | Tourism Manager | • Liaison between NWPB and lodges<br>• Ensure lodges and NWPB are fulfilling their obligations as per their lease agreement |
| 11 | Tourism Officials | • Supporting unit for Tourism Manager |
| 12 | Community Liaison | • Liaison between NWPB and local community members<br>• Ensure MGR meets its primary objective of creating socio-economic development for surrounding communities. |

#### 3.3.1.1.5. ***SOCIAL DEVELOPMENT IN MANAGEMENT***

There is a call for more social development within the reserve (n= 2; 1.23%). As mentioned above, participants have noted a distinct lack of involvement of local communities in the reserve. This has been attributed it to a one-sided management agenda which lacks the required mentorship or engagement necessary for social development to be successful. "*The lodges are limiting their staff, there is no opportunity for them to grow*" (P20). However, there is a contrasting perception from one interviewee relating to this. This could highlight that MGR's primary objective of socio-economic development has been met to some extent by training people from local communities to better hold senior management positions (P23).

Lodges are mandated to have the majority of its workforce consisting of people residing in the local communities (P15). However, participant perceptions indicate that local community members are mostly employed in the lower skilled/earning positions within the lodges (P20): "*It is not because people are not capable, there are a lot of people that are capable to do their job. But I think that a lot of them are probably a bit bottled or not given the opportunity to grow*" (P4). There is a noticeable lack of senior staff members in all sectors of management that are from the local communities (P11). However, participant 26 has highlighted that this issue is not due to a lack of time to develop local community members: "*MGR has been around for 28 years, that is enough time for them to have developed their own local ecologist [from local community members]".*

Although social development aspirations are not perceived to have been met in all facets of management, local communities get the opportunity to run their own community lodges in the reserve. This has been an effective means of social development through imbedded financial interests of the reserve (P23). There are currently two community lodges within the reserve that are "*100% community owned and run*" (P5). But participants note that there have been inefficiencies in the development of local community members due to a "*lack of education*" (P2) and "*guidance*" (P16) to effectively enhance these social development factors in MGR.

It follows therefore, that mentorship is identified as an area of concern (n=4; 2.44%). With the inefficiencies of the reserve being put down as people not having others or predecessors to guide them. As a result, individuals have to learn for themselves by

making *“mistakes along the way and those mistakes have been judged”* (P7). Which participants attribute to a fear of decision-making and a lack of a supportive work environment.

#### 3.3.1.1.6 ***DECISION-MAKING AND ADMINISTRATIVE PROCESSES***

The decision-making (n= 9; 5.49%) and administration processes (n=3; 1.83%) are highlighted as two areas of concern which are counterproductive to MGR management progress. Related issues are thought to be due to the dependency on off-site management parties where decision-making *“is done by people who aren't actually directly involved in reserve management” (P3)* and therefore lacking the local knowledge of the needs of the reserve.

Some participants feel that most of the decision-making is made by politicians that “*have so little understanding of what they're supposed to be doing”* (P12). There is also a sense that there are unnecessary delays in decision-making processes (P19) and that some people are finding opportunities to benefit themselves rather than MGR at large thanks to the ‘*decision-making chaos’* (P19).

The administrative process is also attributed to management counterproductivity, particularly the three-quote system imposed by the Public Finances Management Act 1 of 1999. This system requires that NWPB need three quotes before any equipment or service is purchased for management activities to run smoothly. However, it has been noted that this process is perceived to be a waste of time, for example:

*“So later on, you might address one thing that should have been addressed in a day, within a month or so. This could obviously have knock-on effects because if people came out to look at your gear box and the vehicle has been standing there forever…by the time the gear box is fixed you have to do the whole process again for the battery that has now run flat and needs to be replaced.”* (P23).

#### 3.3.1.1.7. ***ROAD AND FENCE INFRASTRUCTURE MAINTENANCE***

Infrastructure maintenance (n=7; 4.27%), particularly that of roads and fences, was identified as an area of major concern. Poor infrastructure has resulted in permeable fences and frequent game breaches (P10). Game such as kudus, leopards, wild dogs, and elephants have all managed to breach MGR fence lines in recent years (P7).

Road maintenance is a necessity not only for logistical purposes but for guest and staff safety particularly in the rainy season (P21). Bush encroachment around the roads has been identified as an issue particularly when combined with elephant encounters. *"The road is terrible and dangerous; you can't see anything and then all of a sudden you turn a corner and there are elephants"* (P3).

The actual condition of the roads themselves are also seen as dangerous even without bad weather. *"Potholes there are just getting bigger and bigger and someone is going to fall inside and the road is going to give way and people are going to lose their lives"* (P30). The rainy season and damaged roads pose limitations on where field guides can drive, limiting game-viewing potential for tourists and resulting in increased game-vehicle traffic which is "*not what MGR's product is about"* (P7).

#### 3.3.1.2. *SOCIO-POLITICAL ISSUES*

The 'Socio-Political Issues' is the third largest category. It consists of 7 themes that account for 23.78% (n=39) of the total frequency count of the data in this chapter (n=164). This section explains themes categorised under 'socio-political issues' which relate to perceived prevalent issues surrounding: Management transparency and communication (n=14; 8.54%); lack of management cohesion (n=10; 6.10 %); 'North-East versus South-West' political divide (n=9; 5,49%); Language barriers (n=2; 1.22%); Fear to voice opinion (n=2; 1.22%); political tension (n=1; 0.61%) and corruption (n=1; 0.61%) (Figure 3.4).

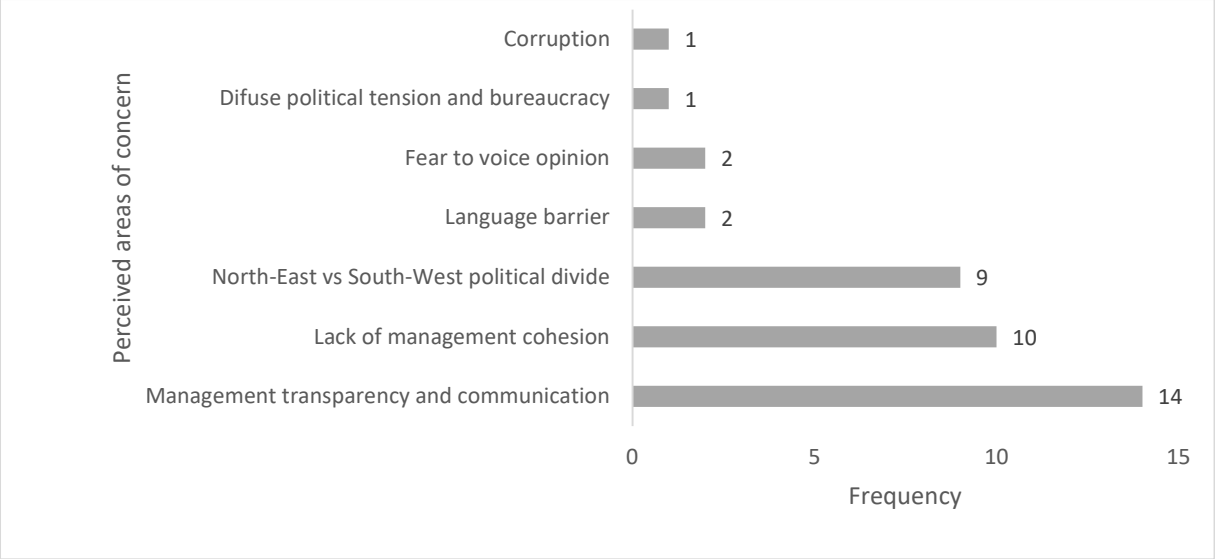


**Figure 3.4:** Frequencies (n=39) of seven themes relating to areas of management concern within the category of 'socio-political issues' as identified by 31 participants

Management transparency and communication are identified as the greatest concern (n=14; 8.54%) followed by a lack of management cohesion (n=10; 6.10%). Similarly, issues relating to the transparency of procurement procedures and the movement of funds have been longstanding in MGR (P1). However, there are contrasting opinions about the transparency of funding transactions, with some participants believing transparency is not an issue. *"It is very transparent; you just need to speak to members of the MFC. They will definitely be transparent but there is definitely no need for them to show exactly where every single cent went with regards to everything" (P2).*

Transparency is further reduced due to communication breakdowns which are often experienced in MGR management, as some key stakeholders are frequently excluded from discussions. *"There's not much communication or planning done to involve the lodge managers or lodge stakeholders to know what they [management] are planning to do"* (P17).

Communication breakdowns are also attributed to language barriers (n=2; 1.22%) prohibiting people, particularly local community members, from participating fully in management decisions (P11). There appears to be a sense of fear (n=2; 1.22%) among participants when it comes to participating in management decisions as noted by some participants: *"I think people are sometimes fearful. I get the idea that people are nervous to say something in case there will be a lot of 'backlash'"* (P18). This hesitation and fear of voicing opinions is double-edged, *"do you do something and you*

*get taken on about it? Or do you not do something and then you're also being seen as not caring about making an effort?"* (P18). However, there is a contrasting view that the reason for counterproductivity in MGR is a result of trying to appease a political climate in which people want to be heard *"I think it is difficult because people aren't afraid to voice their opinions, so everyone needs to be heard even when they don't know the entire background to the situation"* (P12).

Corruption (n=1; 0.61%) and political tension (n=1; 0.61%) additionally hinder MGR's productivity. *"I hope there is a new generation of younger people coming in that can have values that don't get corrupted by power, greed and corruption, and try and see the value in the reserve because corruption has had a huge, huge influence"* (P27). Geographical political tension is present between the people living in the north eastern and south western sections of the reserve (n=9; 5.49%). Many participants referring to it as the 'North-East versus South-West' or *"Beasts in the East and Pests in the West"* (P19). The more active members of the MFC and HO organisations are perceived to live in the North-East side of the reserve. This is perceived to allow the North-East side of the reserve to be more maintained than the South-West, particularly regarding water resources and road maintenance.

This does seem to be a valid concern. When questioned, one respondent stated that it is only natural to want to improve your immediate surroundings when you have the resources to do so before going on to fix issues elsewhere, i.e. *"Don't try to change something in your backyard when you need to fix what's in your house"* (P5). Issues relating to water resources and land degradation are also attributed to the South--West of the reserve being characterised by dolomite soils and sour veld landscapes (Hudak and Wessman 2001) and lack effective watering holes (P13). Some participants feel that this causes animals to migrate more towards the North-East side of the reserve when it rains. In the recent very dry seasons, the South-West only had one dam that had very little water pumped into it while the North-East had multiple large dams being pumped and maintained (P4). Therefore, game-viewing opportunities are perceived to be more favourable in the North-East than the South-West by natural migration and human design.

### 3.3.1.3. *SAFEGUARDING THE ECOTOURISM PRODUCT*

Safeguarding The Ecotourism Product was the smallest category of perceived areas of management concern (n=15; 9.15%), focusing on safeguarding the ecotourism product of MGR. However, these concerns are crucial as they form the basis of MGR's existence - nothing else matters: "*Without tourism, there is no MGR"* (P28). *"We must remember that the only thing that props this place up is the ecotourism product. It's the only thing that benefits us being able to have an environment like this. That is a very important factor, because without that revenue, nothing else is going to be sustainable here. You will lose complete and utter control*." (P28) (Figure 3.5).

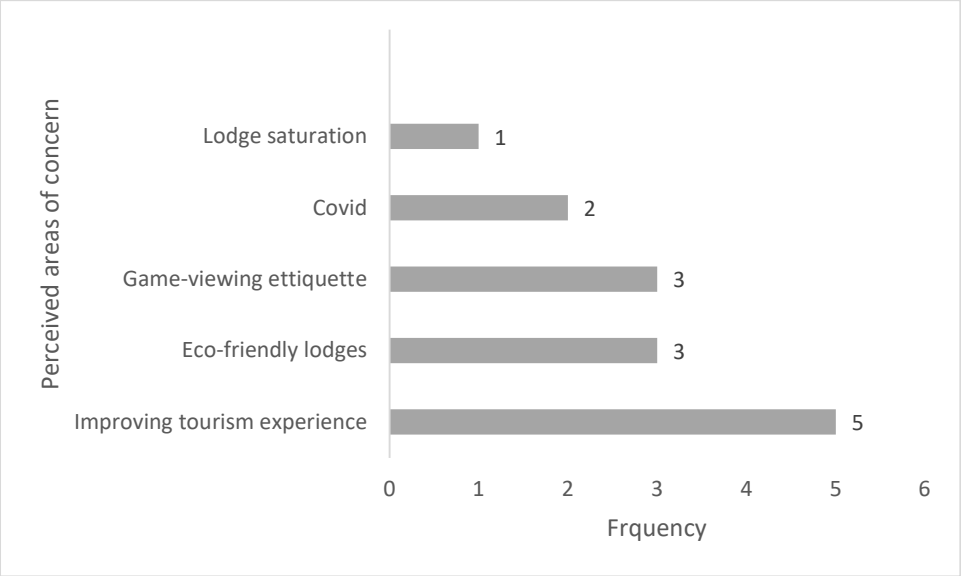


**Figure 3.5:** Frequencies (n=14) of five themes relating to areas of management concern within the category of 'safeguarding the ecotourism product' as identified by 31 participants

Most participants who identified ecotourism issues tended to focus on finding ways to improve the ecotourism experience (n=5; 3.05%) such as better game sightings of charismatic game *"get the leopard sightings up a bit better. Because most guests that come here would like to see leopard and most lodges advertise it as a Big five reserve with all these great pictures of leopards and stuff, but we don't see that, it kind of doesn't happen"* (P26).

A particular area of concern related to field guides adhering to their codes of conduct for game-viewing etiquette (n=3; 1.83%): managing game-viewing sighting that are more for the safety and comfort of the animal rather than getting "*the best shot"* (P13)

for the guests and improving radio etiquette and understanding of radio protocols when communicating with other staff members when tourists are present (P17) were offered as specific options as to how this might be achieved.

Improving lodge 'eco-friendly' sustainability operations (n=3; 1.83%) was also suggested as a way in which MGR could be more inviting to environmentally conscious tourist market. This suggestion was characterised as prioritizing local produce sourcing, reducing carbon footprints, having advanced waste recycling methods, and going off the grid via renewable energy sources.

A concern was raised around possible market saturation of lodges in the reserve (n=1; 0.61%) – too many lodges in MGR place increased pressure on MGR's resources and detract from the feel of 'exclusivity' that MGR uses as a marketing factor. This also, compromises the longevity of the established lodges and contributes to a lack of potential profitability. This fear was exacerbated during the COVID-19 pandemic (n=2; 1.22%). *"Given this time and space, I would say the biggest problem is the guests and tourism part of the park that is taking a knock [because of COVID-19]".* The reserve was closed during the initial stages of the lockdown in 2020 which caused unforeseen issues especially relating to funding (P1) for the reserve and its ecotourism product (P27).

### 3.3.2. PERCEIVED AREAS OF CONCERN FOR CURRENT ECOLOGICAL MANAGEMENT (OBJECTIVE 2)

This section of the data chapter unpacks the findings relating to objective 2 of the study by identifying OSCM perceptions of current areas of management concern specifically relating to ecological sustainability. The greatest perceived area of current (general) management concern (n=164) through all categories is the perceived elephant overpopulation (n=19; 11.56%). The perceived elephant overpopulation also dominated the ecological sustainability-specific management concerns (n=67) category (n=23; 34.33%) (Figure 3.6).

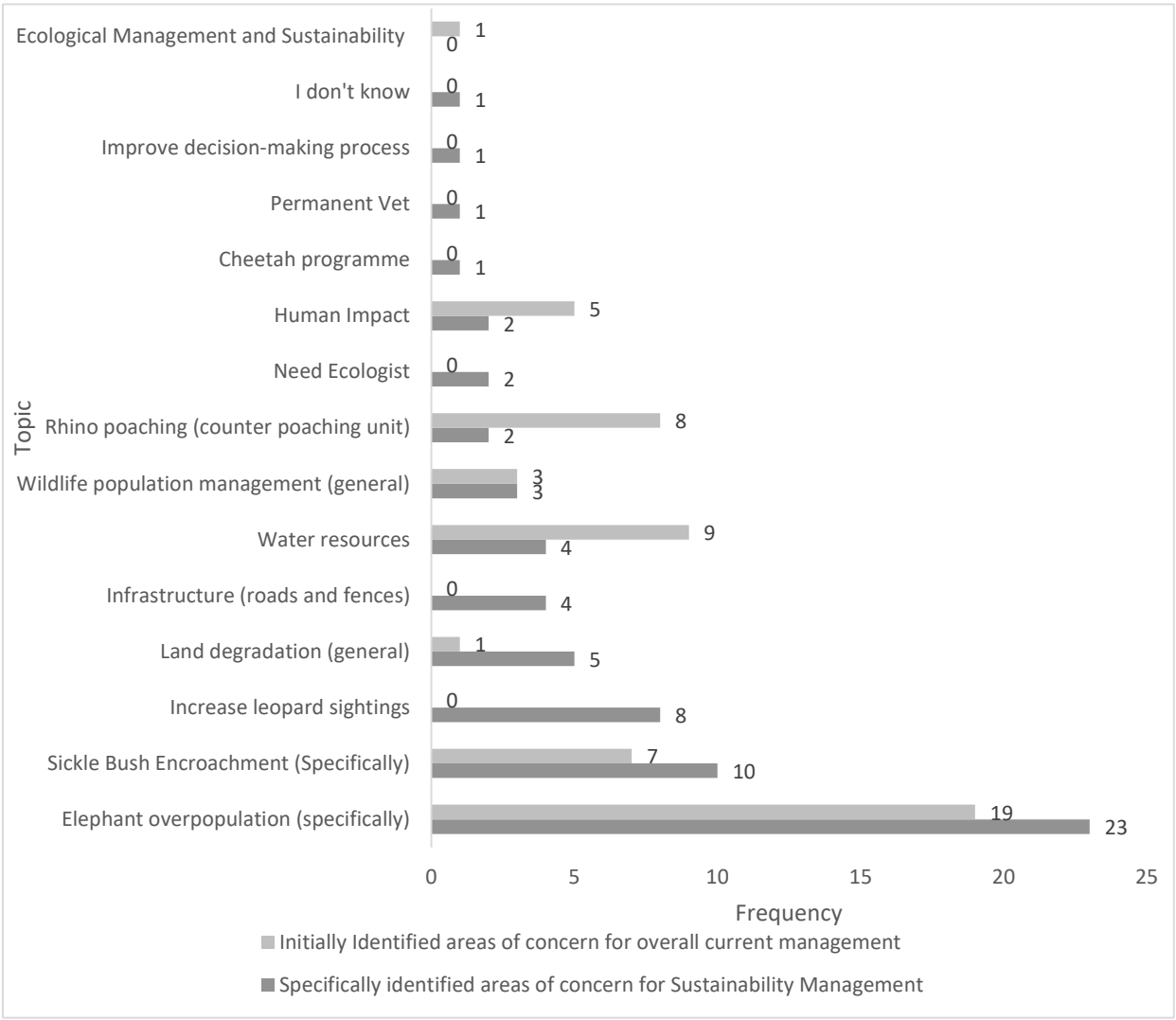


**Figure 3.6:** Frequencies of eight ecological themes identified in general areas of current management concern (n=53) compared to the frequencies (n=67) of 15 themes that were later identified as areas of current ecological sustainability management concern specifically by 31 participants

There are some conflicting perceptions amongst participants regarding the exact initial carrying capacity and the current population count of elephants. Participants perceived the range of carrying capacity to be between 350 and 450 elephants and the current population density is said to be sitting between 1400 and1600 elephants.

In section 3.3.1.3, few respondents identified the maintenance of the ecotourism product and prioritising the ecotourism experience as a concern (n=14; 8,54 %). The

viewing of charismatic and value species like the 'Magnificent Seven', particularly elephants and leopards, appears to drive this. In unrestricted circumstances, these species are known to migrate over large distances (Selier et al. 2018). However, MGR is a fenced social-ecological system and therefore requires human-imposed control to maintain the ecotourism product. In terms of general ecological management concerns, it was apparent that some respondents raised concerns around management in support of single species versus the ecological integrity of the whole ecosystem (P9). The topic of species management, particularly that of elephants, has quite literally become 'the elephant in the room'. There is an identifiable fear among MGR's On-site community regarding the repercussions that turning to lethal population control methods would have on the ecotourism product.

Although some participants advocate a hands-off laissez-faire approach to MGR ecosystem management ("*Eventually nature will take care of itself*" (*P13*)), others argue for a more proactive approach because MGR is entirely fenced. The main concern surrounding the elephant population are the pressure they place on flora biodiversity and the feedbacks resulting from land degradation and herbivore food availability (P14). This pressure is concentrated on the MGR system because it is fenced, and the elephants are unable to move to other areas, giving vegetation a chance to replenish.

#### 3.3.2.1. *ELEPHANT OVERPOPULATION AND CASCADING ECOLOGICAL IMPACTS*

Perceptions surrounding the plight of the ever-increasing elephant population in MGR are multi-faceted, and often conflicting. Some of these perceptions include:

- Elephants do not have any natural predators present in MGR (P4).
- MGR elephants are not only viewed as more aggressive than those in other game reserve but are considered to be smaller in stature and have smaller or no tusks which make them less desirable to poachers. Some participants were of the opinion that the reason for this is that the agricultural land-use legacy and intensifying land degradation has led to a lack in soil nutrition suited to grow strong and long tusks (P11).

- The lack of big-tusked elephants in MGR are also perceived by participants to be due to the soil being hard and degraded, causing the tusks to easily snap whilst trying to dig to get to roots (P21).
- There are no known elephant population response plans in place (P8).
- Elephants and sickle bush are perceived to have a mutually reinforcing relationship (which will be discussed in more detail below) (P2).

I created a diagram to show a synthesised depiction of participant perceptions of the ecological feedbacks in the MGR system. The feedbacks in the diagram are explained in the text below indicated by the corresponding numbers (Example:[1]) in the text. Thin arrows indicate the direction of impact between components whilst thick arrows indicate if the component has increased (arrow pointing up) or decreased (arrow pointing down) due to the cascading impact This synthesis of participant perceptions indicate two major impacts and resulting feedback loops of the elephant overpopulation: A decrease in flora biodiversity and an increase in land degradation as one major reinforcing loop. This first loop is indicative of habitat destruction that elephants are seen to have caused based on their eating habits, especially when in a fenced migration-limiting system (Figure 3.7).

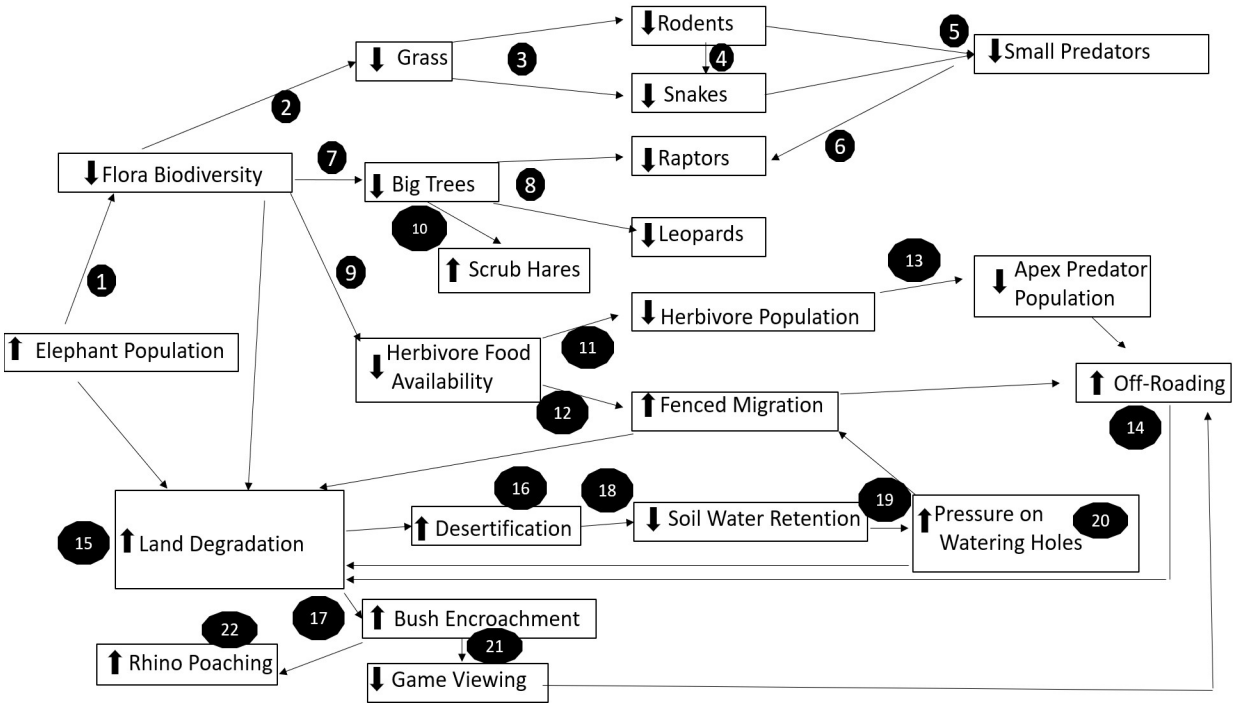


**Figure 3.7:** Mental model diagram representing a synthesis of 31 participants' perceptions surrounding perceived environmental feedbacks and impacts within Madikwe Game Reserve's fenced system

### 3.3.2.1.1. *CASCADING IMPACTS ON FLORA BIODIVERSITY LOSS*

The unencumbered increase in the elephant population has caused a decrease in overall flora biodiversity and density within the reserve [1] which have caused several domino effects within the system. Participants identify two main flora categories of interest, namely:

#### 3.3.2.1.1.1. CASCADING IMPACT ON GRASS AND BIG TREE SPECIES

Firstly, elephant herbivory has been perceived to notably decrease the grass density and biodiversity [2]. Grass not only provides food for other herbivores (grazers) but also is a crucial habitat for snake and small rodent species (P11) [3]. The decline in the food source of the rodent population has created an extra stressor causing a decline in the snake population [4] (P3). This, in turn, has caused a decline in small predator [5] and raptor populations [6] (P12).

Additionally, elephant herbivory has been perceived as the cause for a notable decrease in the big tree density and biodiversity [7] within the reserve. This has resulted in less than ideal habitat conditions for the leopard and raptor populations [8] as well as a decline in food source for other herbivores (browsers) [9].

However, there is a perception that the destruction of big trees has not been entirely negative for all biodiversity. Some participants claim that there is a notable increase in the Scrub Hare *[Lepus saxatilis]* species [10] due to fallen trees providing a more suitable habitat for the species to survive in (P3).

#### 3.3.2.1.1.2. DECREASE IN HERBIVORE FOOD AVAILABILITY

The decline in floral biodiversity and density within MGR has been sites as the cause for decline in general herbivore food availability. Fears surrounding prey species food security are prominent when considering the rate at which elephant eating habits are seen to be adversely impacting floral biodiversity (P1). The view is that this will have a cascading impact of declining the general herbivore population [11] which may result in added pressures on the system through closed-system or fenced migration [12] behaviour to source food and water. Furthermore, this decrease in prey species is perceived to result in a decline in the apex predator species [13] (P26).

#### 3.3.2.1.1.3. IMPACT ON APEX PREDATOR SPECIES

The apex predator species (lions, wild dogs, cheetahs) (along with mega-herbivores, leopards, raptors, and other charismatic species) are perceived to be the main tourist attraction in MGR (P19). This has resulted in pressure on the reserve to maintain high predator numbers to increase game-viewing potential (P5). The decline in floral biodiversity is seen as ultimately impacting the population density and migratory movements of apex predator species through the pursuing of prey species with increased local migratory movements.

This imbalance in the predator-prey ratio created a notable area of concern, particularly due to events relating to a previously larger lion population in the reserve which faced starvation due to a lack of prey availability. Lions were said to be starving which had a negative impact on the tourism product (P12). This was remedied in part by a predator management response plan.

However, there is a sense among OSCM that this may need to be revisited either by a specific focus on predator management or rather more targeted habitat management: *“In my mind I have seen less game than I have seen before, I’m not sure if they moved to a certain area or something but I think we are getting more and more predators back again than what we used to” (P29).* Some participants have attributed this perceived resurgence in predator population increases to ineffective habitat management.

*“I don’t think it's the predators that are the problem and personally I think that it is managing habitat. If you have the correct habitat for animals like wildebeest, impala, springbok etc. where you have open plains areas for them, they will flourish and not get killed as quickly as what they do here [currently]. And that, for me, will control the general game numbers better” (P10).*

#### 3.3.2.1.1.4. LAND DEGRADATION

The cascading impacts from declines in flora and fauna biodiversity and density as well as resulting migratory behaviours are perceived to impact ecotourism behaviour as well. Pressure from tourist to see certain charismatic species, compounded by poor road infrastructure causes increased land degradation from field guides taking their vehicles “off-road” [14] more often than is necessary to increase game-viewing potential (P14). Resulting habitat impacts are amplified during the rainy season as animals are more regularly seen further away from open roads to seek shelter from the rain. In addition, the softer soil is more prone to sink under the weight of the vehicles and cause “dongas” (P9).

The above-mentioned decline in herbivore food availability, increase in fenced migration, and the increase in off-road game viewing are all cited as reinforcing feedback loops surrounding land degradation [15]. Participants have identified two main land degradation impacts in MGR, namely: desertification [16] and bush encroachment of sickle bush [17].

While some areas are perceived to experience severe bush encroachment, other areas seem to have the opposite problem of desertification, both seemingly exacerbated by elephant eating herbivory and behaviours.

The increase in desertification in the semi-arid region has impacted water retention of soil [18] (P27). This in turn places more pressure on watering holes within MGR, particularly during the dry season [19] (P3). Issues surrounding the number and distribution of waterholes in MGR further disrupts migratory behaviour (P5).

Each of the 31 lodges have their own private water hole with some supplying their waterholes with grey water, which is not adequately filtered. This leaves the water filled with other nutrients which cause more animal traffic around the waterholes, worsening the surrounding land degradation [20] (P30).

There are a higher number of large pumped and maintained general watering holes in the eastern section of the park with a constant supply of water compared to the western section, further altering the migratory routes and subsequently impacting the North-East versus South-West socio-political area of concern mentioned earlier.

There have been calls to limit the number of water resources in the reserve, starting with removing watering holes in front of lodges to place more focus on large dams (P17). "*For an experience, it is fantastic, but should you have so many water holes? Is it right? Should there be that much water that is that easily accessible?"*. Participant placed particular emphasis on land degradation surrounding watering holes due to elephants *"When you have a population of elephants at 1400 within a reserve of this size, and you have 31 [additional private] watering holes, you can see that the effects of climate change are going to have a negative knock-on effect from over utilization of general areas around that water holes"* (P15).

The agricultural land use legacy of MGR has left the system with a foundation of land degradation, particularly with the bush encroachment of sickle bush. The sickle bush, as an invasive pioneer species (Hudak and Wessman 2001), tends to grow faster and hardier under harsher conditions than other flora species in the area, thus thriving in the degraded landscape. Some participants view the sickle bush encroachment as the natural "scar tissue" (P23) of the landscape and, if left alone, will eventually finish its lifecycle and not be an issue to the reserve in time to come (P30). However, the sickle bush encroachment decreases game-viewing potential by further concealing animals from the view of the roads [21] (P14). This makes, the management of the bush encroachment crucial when balancing ecotourism interests versus those of its ecological function. *"Sickle bush grows as a scar tissue, it grows as trying to re-*

*establish and rehabilitate certain areas, if we remove at all we only hastening for one thing, game drives. We're not looking at it in an ecological term, where it has its benefits"* (P28).

Sickle bush encroachment has also decreased flora biodiversity. This resulted in a decrease in habitat diversity within MGR. Some participants highlight that sickle bush thicket is usually seen as a suitable habitat for the endangered black rhino population, but the system needs to be balanced. *"People might say that it is good for the buffaloes and the rhinos - but they don't need 75 000 hectares of it. They can have certain blocks and certain areas of it where those animals can stay there, and you can leave the* sickle bush*. Although the sickle bush is natural, but its amount and intensity is unnatural because of the overgrazing"* (P18).

The dense sickle bush areas add another risk dimension to MGR management. Due to their inaccessibility for monitoring these areas allow for an escalation of poaching incidents [22] (P7).

*"Every single time a rhino has been poached, apart from a few exceptions, they are being hammered in the thick sickle bush areas. And [counter-poaching unit] can't man those areas, we've got the canine units, and we get the choppers in and whatever. But getting in there is the problem, it's hard. you've got cover for the poachers to hide and move around in" (P7)*.

#### 3.3.2.1.2. ***ELEPHANT AND SICKLE BUSH FEEDBACK LOOP: CONSEQUENCES FOR HABITAT INTEGRITY***

Sickle Bush encroachment and elephant overpopulation are perceived to be the two major areas of concern for the ecological integrity and sustainability of MGR. It has been highlighted that these two factors have a mutually beneficial relationship (P7). The sickle bush encroachment provides an added food source to sustain the elephant population in the heavily degraded landscape. Elephant destruction of other flora biodiversity gives sickle bush room to establish in the spaces left in by elephant herbivory. However, if given other (tastier) alternatives elephants will not make sickle bush its "*top priority and rather trample it to get to other vegetation"* (P8). This creates the perception that whilst other browsers may shy away from eating the sickle bush under most circumstances, elephants usually eat sickle bush regardless. *The problem*

*with the sickle bush is even though it gets trampled and eaten, it just comes back out thicker and thicker. [The sickle bush] gives you flat tyres but it keeps the elephants alive*" (P16). The consumption of sickle bush by elephants is "*seen as a "saving grace" in terms of sustaining the elephant population for so long"* (P21). However, this symbiosis will eventually reach a tipping point "*And then they [the elephants] will eventually deplete the sickle bush*. *And then you will be left with sand. And at that stage, all of these capital models of these lodges will have to disappear because nothing will be sustainable"* (P21).

#### 3.3.2.2. *ELEPHANT BEHAVIOUR AS AN EVENTUAL DRIVER OF CHANGE IN MANAGEMENT APPROACH*

It may take the already perceived "*aggressive"* elephants increasing their adverse behavioural responses to humans borne out of frustration and starvation to spark the need to intervene in the system's feedbacks (P8). However, there is evidence that this is already occurring in the system with food shortages already impacting on elephant behaviour *"There were never elephants breaking into camps, this started happening three or four years ago. The only reason why it is happening now is because of the food shortage".*

However, participants note that the abovementioned impacts on elephant behaviour are compounding on already established issue. Adverse behaviours from MGR's elephant are perceived to be the result of previous traumatic events experienced by the elephants before being moved into MGR.

*"We've got already a bit of a troublesome population of elephants. These elephants aren't really that well in the head, …all the Kruger culling elephants, all Gonarezhou elephants, these elephants, some of them in their living memory, have been shot at"* (P9).

## 3.4. DISCUSSION

This section discusses the findings of objectives (1) identifying OSCM perceptions of current areas of management concern and (2) concerns specifically surrounding the ecological sustainability of the reserve. The main findings of objective 1 is centred around the general theme of *governance efficiency*.

The factors surrounding governance inefficiency will be discussed, including the main themes of strategic agency and institutional entrepreneurship, resource distribution, and management cohesion. The main findings of objective 2 are centred around the ecological sustainability of MGR and its main area of concern, the system's perceived *elephant overpopulation*. its cascading impacts. This objective further unpacks the implications of the trade-offs between maximizing short term ecotourism and ecological benefits in MGR, creating implications for other ETBPAs potentially facing similar issues.

### 3.4.1 STRATEGIC AGENCY AND INSTITUTIONAL ENTREPRENEURSHIP

ETPBAs are complex and adaptive social-ecological systems impacted by cross-scale pressures and stressors (Cumming et al. 2015; Cumming 2016; Cumming and Allen 2017), that cannot be managed using a static perspective. The management of ETBPAs, like MGR, need to be able to adapt to the ever-changing variables of the system to increase their resilience (Stein et al. 2013; Cumming et al. 2015; Choi et al. 2021).

The findings of this study show that although the overarching objectives of MGR throughout the years have remained the same, its socio-political and environmental conditions have not. The cascading feedbacks of government inefficiency have left the management structure and its processes with noticeable functional gaps. As a result, MGR has seen many OSCMs, namely those involved in the MFC and HOs, portraying strategic agency in the system. This has been primarily through these groups attempting to assist in management processes by filling in these gaps on a volunteer basis whilst simultaneously continuing with their original positions in MGR.

Due to the entrenchment of their private and professional lives in the MGR system, OSCMs are potentially more sensitive to the dynamics, impacts and feedbacks of the system (Berkes 2002; Gaymer et al. 2014; Agyeman 2014) . The institutional

knowledge and socio-political resources formed from this deep-rooted system entrenchment has provided some individuals the ability to become change actors in the system through their strategic agency (Westley et al. 2013; Werbeloff et al. 2016; Kornberger 2017).

However, the findings of this study demonstrate that strategic change agency in MGR's system is not necessarily aimed at completely transforming the system. Rather, strategic agency is aimed at transforming OSCM's own roles in the system to maintain MGR's ecotourism product despite challenges relating to governance inefficiency (Westley et al. 2013; Howes et al. 2015; Werbeloff et al. 2016). This can be seen through individuals in the on-site community leveraging their own resources such as institutional knowledge (mainly expressed by HOs), financial resources (Mainly expressed by the MFC), time, and labour to fill key management gaps required to maintain MGR's ecotourism product (Battilana et al. 2009; Werbeloff et al. 2016).

Some OSCMs enacting strategic agency in the system show traits indicative of DiMaggio's (1988) 'institutional entrepreneurship', creating change within the management of the system to better realise certain individual goals of their own (DiMaggio 1988; Westley et al. 2013; Werbeloff et al. 2016). However, the findings show that some HOs and the MFC express institutional entrepreneurship differently in the system based on their personal values and priorities.

HOs are shown to use their institutional knowledge and guiding background to assist mainly in maintaining conservation duties in MGR. This could be due to their intrinsic valuing of MGR through personal passion for conservation (Arias-Arévalo et al. 2017a). OSCMs can also be seen to relationally value the system through safeguarding their sense of place and attachment to the landscape in MGR (Brown and Raymond 2007). However, this strategic agency could also be indicative of instrumental valuing of the system through institutional entrepreneurship to meet their own personal goal of ensuring job security (Stern and Dietz 1994; Arias-Arévalo et al. 2017a). By ensuring that MGR's ecological matters are attended to, the HOs are safeguarding the ecotourism product of MGR which is fundamental for the longevity of the lodges that provide them with employment. Similarly, private investors in the MFC who have created alternative funding initiatives for the reserve and its maintenance projects can also be attributed to instrumentally safeguarding the

ecotourism product and therefore safeguarding the profit potential and longevity of their assets in the reserve.

The different ways in which OSCMs are trying to safeguard the ecotourism product of the system by utilizing institutional entrepreneurship is indicative of different value systems present in the on-site community which may have implications for MGR's management efficiency (Jones et al. 2016; Kornberger 2017). The identification of these diverse values in the MGR system provides a new avenue for further research to better understand the roles that values play in shaping decisions and interactions in ETBPA management. This would bring more valuable insights to the literature as the influence of human values on environmental management of PAs has to date, been poorly studied (Floress et al. 2015; Castro et al. 2016; Jones et al. 2016; Arias-Arévalo et al. 2017a).

The findings show the strategic agency expressed in the MGR system has potentially been a crucial component in ensuring MGR's continuing functionality despite its governance inefficiency. However, strategic agency has not been a panacea to all management issues which are still evident in the system. In some cases, the realizing of individual goals through strategic agency and institutional entrepreneurship has exacerbated, rather than aided in some integral management issues such as resource distribution.

### 3.4.2 RESOURCE DISTRIBUTION

#### 3.4.2.1. *FINANCE*

The first major factor of resource distribution in MGR is a financial one. MGR is not unique in this issue. PAs, particularly in the Global South are notoriously underfunded (McCarthy et al. 2012; Lindsey et al. 2018; Coad et al. 2019; Tear et al. 2021). This is in part, because of governments undervaluing the ecosystem services that ecotourism not only safeguards but profits from (Guerry et al. 2015).

However, ecotourism is gaining traction in providing significantly high net-profit revenues for African countries through their international tourist attraction potential as well as providing job creation for surrounding communities that are generally impoverished (Agyeman et al. 2019; Lindsey et al. 2021). This, coupled with the ever-

increasing value in safeguarding ecosystem services for human survival in an Anthropogenic world seems to make governments' reluctance to fund the maintenance of the ETBPA networks counter intuitive. Lindsey et al. (2021) have attributed this reluctance of government to seek greater alternative financial assistance to a perception that such acts might represent a sense of government failure, undermining its sovereignty and create revenue losses as a result.

Participants have indicated that this financial crisis starts at the top with the Public Financial Management act 1 of 1999 legislating seemingly unfair resource distribution in the NWPB network. With MGR and the Pilanesberg National Park being the highest revenue producing PAs in the North West Province by a substantial margin, they have been made to pay for their successes by having their funds collectively pooled and distributed to the area's 13 other reserves under NWPB's management (North West Parks Board 2020). With MGR's current financial crisis being a major concern, there is the question surrounding the efficiency of privatization, putting MGR's management model into question (De Vos et al. 2019;). There is an underlying sense that some might feel unmotivated to push for more profiteering efforts if MGR does not enjoy the fruits of its labour. However, MGR government funding distribution needs to be carefully reconsidered. The literature has shown that how ETBPA management chooses to distribute its funding holds major implications for its efficiency and effectiveness (Gullison 2009; McCarthy et al. 2012; Banerjee et al. 2018).

The MFC have attempted to remedy issues surrounding government funding shortfalls by creating a conservation levy which is dedicated solely to MGR conservation initiatives. Although this seems to be a good-intentioned effort, it has created a further financial imbalance in the internal resource distribution of these private funds within the reserve which have created implications for socio-political issues.

### 3.4.2.2. *POLITICAL TENSIONS AS AN UNDERTONE IN RESOURCE DISTRIBUTION*

Although one participant identified corruption as a major area of management concern, it is a topic that many in general society are reluctant to expose or elaborate on for fear of job and social security (Irland 2008; Watson et al. 2014; Tacconi and Williams 2020). In relatively small and tight-knit communities like MGR, the fear to whistle blow on such issues is often amplified (Bowen and Blackmon 2003; Dyne et al. 2003).

Despite some participants claiming the lack of government funding in MGR is due to corruption, there also seems to be an underlying tone of presumed bias in how private funds are internally distributed to certain areas within MGR. This sentiment surrounding the perceived North-East versus South-West socio-political divide is the primary point about which some feel decisions are being made for personal gain rather than for the good of the reserve. This is exacerbated by the fact that more influential actors reside in the north eastern section of the reserve.

This tendency for geographical favouritism is most clear when looking at the privately funded conservation maintenance efforts in the North-East while the South-West's legitimate road, water, and bush encroachment are treated as secondary. This not only impacts the ecotourism product in the affected area, but the overall profitability and sustainability of the reserve as a whole due to the inefficient way in which hard earned private funding is being distributed. However, this socio-political divide seems to be multifaceted and complex with some contrasting views of the cohesiveness of the on-site community in MGR which we recommend be explored further.

Although there are some OSCMs that think there may be some bias in how private funds are distributed within the reserve, there is still the overarching perception that the NWPB has had critical financial issues which have been alleviated by the assistance from the MFC. The MFC have been noted to go above and beyond with their strategic agency efforts to fill this financial gap by providing substantial amounts of alternative revenue to help safeguard MGR (North West Parks Board 2020). Considering how the MFC funding has been described by participants, it is clear that MGR, albeit with some questionable distribution methods, would not be able to financially function without the help of the MFC and its strategic agency in the system. However, some participants have noted that this strategic agency is not the most

efficient way to manage the reserve. HOs and the MFC are voluntarily filling the gaps of management roles that should normally be filled by government officials who have suitable qualifications to enact those roles. It is unclear from the data if any of these individuals are correctly qualified to fill these management roles, even on a volunteer basis. However, the ecological impacts of the reserve are not indicative of a holistic balance between maximizing ecotourism potential and maintaining ecological sustainability. Therefore, the capacity, knowledge and priorities of these strategic agents filling key management roles holds major implications for the reserve's ecological efficiency (Jones et al. 2016; Kornberger 2017; Arias-Arévalo et al. 2017). Therefore, the resource distribution issue also extends itself to a human resource issue through having inadequately filled positions in the management structure.

### 3.4.3. INADEQUATELY FILLED POSITIONS

One of this study's major findings which underpins many of the governance inefficiencies of the reserve is the inadequately filled positions in its management structure. These inadequacies are mainly attributed to people who are not necessarily qualified for the positions but are filling them any way (usually because of strategic agency) or positions that aren't filled at all. The cause of this short-staffed anomaly is questionable, particularly when considering one of the key objectives of the park is socio-economic upliftment via job creation. This is critical in South Africa, which has one of the highest unemployment rates in the world (Khalid et al. 2021; Nkoane and Seeletse 2021).

Although the findings show political bureaucracies and financial constraints being the leading causes for this lack of role fulfilment, there are some key positions which in theory would render the ETBPA functionally ineffective if left unfilled. One of the main positions of concern is that of an ecologist. Although no legislative document was specifically named by any of the participants, there was consensus among the OSCMs that should a government role be vacant for more than three years that it is considered redundant.

MGR is one of the largest reserves in South Africa (North West Parks Board 2020; Szott et al. 2020), so it is unusual for a key position like an ecologist to be deemed redundant. As a result, the HOs have stepped up and attempted to fill this role, leveraging their field guide knowledge and passion for conservation to ensure MGR's

ecotourism product remains functionable. Therefore, there is an element of local and practitioner ecological knowledge being utilised in the management of this system. However, scientific knowledge has been largely absent for some time, with clear implications for MGR's ecological sustainability and integrity. Similarly, managing ecosystems to maximize ecotourism profits, which my results revealed to be a key motivating value, can undermine ecosystem integrity. For example, the two individuals who have assumed the role of the missing ecologist in the reserve are mainly concerned with managing charismatic species, namely megaherbivores (elephants and rhinos) and apex predators (lions, wild dogs, cheetahs, and leopards). Although these species are required for MGR's ecotourism objectives, the findings indicate that participants feel there is a noticeable lack of landscape management or holistic approach to MGR's ecological system management. The projects that do concern themselves with landscape factors relate to the clearing of the sickle bush encroachment. However, my findings show that this is not enacted in a strategic sense for greater ecological purposes but more to open-up areas for better game-viewing and rhino counter-poaching purposes. Although tourist attraction potential is vital in keeping ETBPAs economically viable (Kirkby et al. 2010; Dologlou and Katsoni 2016), the prioritisation of ecotourism management over the overall ecological maintenance is not sustainable (Chiutsi et al. 2011; Selier et al. 2016, 2018).

MGR's conservation projects, which are mostly voluntarily run by HOs, are mainly funded by the MFC. This does provide some clarification as to the prioritisation of maintaining ecotourism-based profits. However, these projects do still require clearance from NWPB officials to be enacted. The current key on-site governance positions that are meant to be filled by NWPB officials are seemingly abandoned (Operations Manager, Accountant, Tourism Liaison, Community Liaison) except for the overarching role of the reserve manager who, with the support of the MFC and HOs strategic agency, is perceived to juggle these requirements in order for the reserve to stay open and functional. Sadly, MGR's underfunding and understaffing issues are not uncommon. Other studies have indicated these issues are regularly experienced by PAs, ultimately hindering their effectiveness and potential for success (Pfeifer et al. 2012; Rife et al. 2013). Therefore, this creates an increased reliance on management cohesion between those remaining individuals running the system to try increase its governance resilience with the resources it does have.

### 3.4.4. MANAGEMENT COHESION

Cohesion amongst management actors increases PA resilience through the increase of collective action, trust and knowledge sharing (Brondizio et al. 2009). Management cohesion is particularly important for resilience in ETBPAs like MGR as it compensates for the lack of diversity and redundancy in the system (Brondizio et al. 2009; Biggs et al. 2012). However, it is evident from the findings that the social dynamics of MGR's OSCMs has some room for improvement. There were contrasting perceptions regarding transparency and clarity of the management activities and the legalities of the current hybrid ad hoc management structure. Yet, there was an undertone of some institutional stickiness (Jensen and Szulanski 2004) through a hesitation to 'rock the boat' due to uncertainty regarding possible negative implications if the current system, which many viewed as functional albeit triaged, changed. Therefore, many have viewed it better to leave things as is. Unfulfilled socio-economic development promises have also added fuel to the governance inefficiency fire. This is clear in the findings which indicate that MGR has not met its primary objective of socio-economic upliftment. The way in which participants discussed the topic of social development suggested feelings of disappointment and helplessness.

On the surface, MGR has provided many jobs to the surrounding communities, but there is the sense that the quantity of job creation is not in question but rather the quality. The objective to provide platforms for skills development seems to be lacking, with very few local community members being viewed as occupying places senior management. This in turn has seemingly decreased the cohesiveness between the three main 'legs' of the MGR stakeholder potjie pot; 1) the government, 2) the private investors and 3) local communities (Madikwe Development Task Team 1997; Davies 2000; Magome et al. 2000; ICS 2006; Bologna 2008). Unfortunately, this is not a new development in the system. Bologna (2008) conducted research in MGR regarding the involvement of local communities in the early 2000s. At the time of publication, the reserve had been operational for over a decade. However, Bologna termed the local community members as 'stick holders' rather than 'stakeholders' in the MGR system, highlighting their noticeable lack of power, involvement, and benefit which they were promised from the reserve over a decade after its inception. This is concerning as there are currently many vacancies in MGR's key management roles. Furthermore, MGR has been established long enough for them to have skills development

programmes that should theoretically be able to educate villagers to the point that they are able to progress up to senior management positions. Therefore, this discrepancy between theory and practice of MGR's supposed main objective brings its management priorities into question.

These findings add to the plethora of literature dedicated to researching local community involvement in PAs on a global scale (Rogerson 2006; Gaymer et al. 2014; Agyeman 2014; Mutanga et al. 2015; Agyeman et al. 2019), creating implications for research to investigate how effective ETBPAs truly are in meeting their promised social development goals for their surrounding local communities. This acts as a further prompt for more cohesive and equitable involvement of local community members in PA management to ensure socio-economic upliftment is met in practice as it is promised in theory (Rogerson 2006; Bologna 2008; Bennett and Dearden 2014; Bologna and Spierenburg 2015; Thondhlana et al. 2016; Agyeman et al. 2019; Abukari and Mwalyosi 2020).

Participants have attributed the inadequacies of social development in the system to a lack of skills development, incohesive management, and a lack of mentorship in the management structure to allow local community members the opportunity to grow in the various career fields encompassed in MGR. The findings attribute the inefficiencies of those operating within the management structure to a lack of mentorship for trying to fill gaps in the system without any guidance from the position's predecessors. Mentorship has been shown to be a major contributor to success in many business structures, promoting better leadership and resilience for those moving up the career ladder (Hund et al. 2018).

### 3.4.5. MADIKWE GAME RESERVE'S ECOLOGICAL SUSTAINABILITY

MGR's governance inefficiency and ad hoc tourism product-focused approach to its ecological management has caused significant adverse ecological impacts throughout the system. This is likely exacerbated by the lack of an ecologist to monitor and maintain the system and exposes a scientific knowledge gap in MGR management decisions. As I will argue below, If this current ecological management trajectory is not altered, MGR could be facing a potentially severe biodiversity crisis.

MGR has always maintained that its primary objective was to promote socio-economic development through ecotourism, making conservation a secondary objective driven by a focus on creating optimal game-viewing potential to promote the ecotourism product (Madikwe Development Task Team 1997; Davies 2000; Magome et al. 2000; ICS 2006). This overarching objective alone required a fine-tuned balancing act from an ecologist to maintain the balance between ecotourism interests and maintaining the ecological integrity of the reserve to ensure the sustainability of the ecotourism product.

However, OSCMs perceive this balancing act as being inherently harder because of the compounding impacts of MGR's inherited intensive agricultural land-use legacy (Hudak and Wessman 2001; Bürgi et al. 2017). This has left the reserve in a state of severe land degradation – another major task to consider in the ecotourism and ecological sustainability balancing act. ETBPAs like MGR that form part of pastoralism-to-tourism land use change models generally deal with compounded ecological management issues due to their land-use legacy (Hoffman and Rohde 2007; Bürgi et al. 2017; Martin et al. 2017). This creates implications for ETBPA management needing to prioritise ecological management to sustain the ecotourism product (Hoffman and Rohde 2007). However, this contrasts with the current prioritisation that is experienced in MGR. Participants have attributed the lack of an ecologist for nearly a decade to the inability of MGR management to make informed decisions that incorporate an interconnected knowledge of the finer interactions between fauna and flora. This is highlighted by the way management prioritises game-viewing potential of charismatic species over the ecological sustainability of the system.

#### 3.4.5.1. *ADDRESSING THE ELEPHANT IN THE ROOM: ELEPHANT OVERPOPULATION IMPLICATIONS*

The findings of this research indicate the top concern amongst MGR's OSCMs is the overpopulation of elephants and their cascading impacts in the reserve. Elephant population management has ironically become the 'elephant in the room' amongst members of MGR management. The desire to be the decision maker in the questions surrounding how to address the elephant issue is seemingly on par with a desire to voluntarily pay more taxes.

All participants (n=31) are aware of the elephant overpopulation issue. However, there is an acute understanding in the on-site community of the potentially devastating implication choosing the wrong wildlife population control method will have on the ecotourism product. These concerns particularly relate to elephants as they one of MGR's main tourist attractions. This reluctancy to make a decision regarding elephant management further highlights the reserve's ecological management being more in line with ecotourism interests than safeguarding the holistic ecological integrity of the reserve. Additionally, this portrays the diversity of values present in the MGR system, particularly relational and instrumental, which potentially influence the management strategies of the system (Kornberger 2017; Arias-Arévalo et al. 2017a).

As is the case in many fenced reserves globally (Selier et al. 2016, 2018; Clemen et al. 2021), the elephant population in MGR is becoming increasingly difficult to manage. The results indicate that OSCM perceptions place the MGR elephant population currently at roughly 400% over its original carrying capacity resulting in severe ecological impacts (Selier et al. 2018; Szott et al. 2020).

Being a fenced system, participants attribute the decimation of MGR's floral biodiversity to elephant herbivory which has exacerbated the inherited land use legacy issue of land degradation (Hudak and Wessman 2001; Bürgi et al. 2017). From an ecotourism perspective, participants perceive the decline in flora biodiversity as particularly concerning, especially regarding the severe decline in big tree species. Not only has this altered the aesthetic of certain parts of the reserve for ecotourism, but it has also decreased the habituation potential for raptors and leopards (Vogel et al. 2014; Selier et al. 2018; Mausolf et al. 2018), thus decreasing bird and leopard sightings for the reserve. This is a cause of concern for many ETBPAs and creates implications for ETBPAs that have birding enthusiasts as part of their tourism market (Vogel et al. 2014).

Participants have noted cascading impacts due to floral biodiversity decline relating to the wildlife biodiversity in the reserve, particularly with the smaller mammal and reptile populations being notably altered in diversity and density (Guldemond et al. 2017) However, it has been seen in the findings that this impact will soon follow to include larger herbivore and predator species if the current trajectory remains. Negative implications are generally associated with elephant herbivory in fenced systems

(Pringle 2008; Selier et al. 2018). However, OSCMs perceive this to have positive impacts on scrub hare populations. This is seemingly due to the debris left in the wake of elephant herbivory activities providing sufficient habitats for scrub hares to thrive (Guldemond et al. 2017). This highlights that elephants, if managed correctly, are still valuable keystone species as agents of habitat change (Pringle 2008; Guldemond et al. 2017).

#### 3.4.5.1.1. ***ELEPHANT POPULATION CONTROL***

The lethal control of elephant is a double-edged sword (Selier et al. 2018). Trophy hunting is mainly marketed towards the killing of bulls who are of an age to have already participated in breeding seasons (Hariohay et al. 2018). Therefore, trophy hunting does not necessarily contribute to a significant decrease in a population size (Hariohay et al. 2018). However, trophy hunting is the most lucrative forms of capital injections to PAs (Hurt and Ravn 2000; Hariohay et al. 2018) and provides socio-economic benefits through meat and materials for local communities from the carcass of elephants (Hurt and Ravn 2000; Gressier 2014; Hariohay et al. 2018). However, the socio-political backlash is a major deterrent (Hariohay et al. 2018). Elephants are idolised and valued in many cultures across the world and considered sentient beings in general society (Chamaillé-Jammes et al. 2007; Selier et al. 2016; Slotow et al. 2021), thus making the active destruction of the species, even for management purposes and not sport, a major tourism deterrent for ETBPAs (Hurt and Ravn 2000; Gressier 2014; Hariohay et al. 2018).

Lethal population control of elephants is also cautioned against due to the adverse behavioural impacts of the megaherbivores due to their highly complex social structures and the trauma associated with being exposed to death at the hands of humans (Hurt and Ravn 2000). Without correctly catering to elephant needs, their behaviour can cause major destruction and dangerous implications for human safety in ETBPAs (Hoare 1999; Viljoen et al. 2015; Szott et al. 2020; Di Minin et al. 2021) In this study, participants have cited a fear that lethal population control of elephants will cause them to have a negative association with humans, which can cause them to be aggressive towards people, making tourism experiences dangerous (Shannon et al. 2013; Szott et al. 2020). This is not an unwarranted fear, human-elephant conflict is a major concern in many parts of Africa (Hoare 1999).

Other alternatives include contraceptive and the relocation of elephants to other areas (ICS 2006). However, the findings from participants indicate that both of these alternatives are extremely expensive as well as administratively and logistically taxing. Although the use of contraceptives in elephants have been documented (Koenig 2007), MGR's population is perceived by participants to be too large to warrant such a project. The relocation of elephants is usually suggested to bring elephants to areas that have a declining population due to poaching. This comes with severe negative implications of worsening elephant behaviours towards people (Hoare 1999; Chase et al. 2016; Di Minin et al. 2021) and is considered as getting someone else to do the 'dirty work' of lethally controlling elephant numbers via illegal poaching or hunting (Gressier 2014; Rashidi et al. 2018).

Therefore, the seemingly more socially acceptable method of elephant population management is by expanding the ETBPA to better accommodate their growing numbers. However, this is a more difficult avenue to explore as PAs are already chronically underfunded and any expansion efforts require revenue that they are already struggling to acquire to keep their current areas functional (Gullison 2009; McCarthy et al. 2012; Cook et al. 2017). Additionally, consideration must be given to the notion that ETBPA expansion to accommodate elephant populations could potentially create a larger spatial issue and/or relocating the issue of elephant-induced land degradation spatially and temporally (Vogel et al. 2014),

With the above in mind, it is clear why there is such hesitation to implement elephant population management plans. However, as highlighted in Selier et al. (2018) this does not negate the fact that the destruction they cause in fenced systems needs to be addressed. MGR elephants are perceived to be the main influencers of landscape degradation through both deforestation and as a promoting factor of bush encroachment of the reserve.

#### 3.4.5.1.2. ***ELEPHANT AND SICKLE BUSH RELATIONSHIP***

As mentioned above elephants and sickle bush encroachment are seen to be the two main perceived areas of concern for MGR sustainability management. However, the two elements seem to have a reinforcing relationship. Sickle bush is an invasive pioneer species with the capacity to grow at a faster rate in less-than-ideal conditions compared to other flora species (Hudak and Wessman 2001; ICS 2006). Sickle bush

encroachment is entrenched in the MGR system through the land use legacy of heavily degraded cattle farmland (Hudak and Wessman 2001; ICS 2006; Bürgi et al. 2017). The destruction by elephant herbivory removes competitive flora species making space for sickle bush to expand. This intensification of sickle bush encroachment has notably also created a difficult environment for counter-poaching efforts. Participants have noted that due to the density of the bush encroachment, it restricts rhino monitoring capabilities, causing rhinos to fall prey to poaching in the thicket. Therefore, this once again highlights the importance of holistic ecological management in ETBPAs as neglecting landscape management poses negative implications for rhino conservation efforts and safeguarding the ecotourism product.

Although participants indicated that sickle bush was not the primary preferred food source for elephants, they will utilize it as a food source in the absence of other woody vegetation in the system. Therefore, participants note that the sickle bush has been the elephant's saving grace for sustaining the population. However, the multifaceted cascading impacts of destructive elephant eating habits are already evident in the system.

#### 3.4.5.1.3. ***FOOD AVAILABILITY IMPLICATIONS FOR OTHER WILDLIFE***

As postulated by OSCMs in this study, as well as other ecological studies in MGR (Hudak and Wessman 2001; ICS 2006; Szott et al. 2020), the increase in bush encroachment and desertification in MGR through elephant herbivory destruction is creating a decline in flora biodiversity resulting in food insecurity for other herbivores in the system. OSCMs have perceived cascading impacts on other factors in the reserve including: an increase in land degradation (Hudak and Wessman 2001; Selier et al. 2018; Itzkin et al. 2021) and a decrease in herbivore species which will ultimately cause a decline in apex predators (Pringle 2008; Vogel et al. 2014; Guldemond et al. 2017; Kanagaraj et al. 2019). However, elsewhere in African savannas, studies have indicated that changes in habitat due to elephant herbivory are beneficial to some herbivore species (Fritz et al. 2002; Rutina et al. 2005; Makhabu et al. 2006; Valeix et al. 2008). Browser populations, such as kudu [*Tragelaphus strepsiceros*] and impala [*Aepyceros melampus*] have been shown to increase due to habitat change caused by elephant herbivory (Makhabu et al. 2006), whilst strict browsers such as giraffe populations [*Giraffa*] have been seen to be unaffected by food availability due to

elephant herbivory (Fritz et al. 2002). Makhabu et al. (2006) indicated that kudu and impala tended to favour browsing on shrubs that have experienced coppicing through elephant herbivory rather than the shrubs left untouched by elephants. This is an ecosystem impact that was not portrayed by participants in this study but is a notable consideration for future research.

Unfortunately, participants highlight that the initial signs of starvation in charismatic species will be the 'tip of the iceberg' of the ecological crisis in the reserve which may be too late to counteract. Additionally, the resulting decline in the aesthetics of the landscape and malnourishment of charismatic species will ultimately impact the ecotourism product (Chiutsi et al. 2011). This brings the management model of ETBPAs into question. With decreasing space available for PA expansion, ETBPAs face difficult decisions in managing their ecotourism product and ecological sustainability when it comes to elephant management. However, the fear of tourism backlash needs to be outweighed at some point by safeguarding ecological sustainability if ecotourism is to remain a viable PA model. However, the question remains of when ETBPA management actors wish to draw this line and shift their focus.

## 3.5. CONCLUSION

The OSCMs who participated in this study have highlighted various areas of management concern. However, on closer reflection, most of these areas of concern are interlinked through one main underlying theme: governance inefficiency. Governance inefficiency is multifaceted in its cascading impacts on MGR. In an attempt to alleviate these impacts, strategic agency has emerged in MGR's governance system through its OSCMs. However, this strategic agency has seemingly been unable to eradicate the main factors of this governance inefficiency, namely: resource distribution, inadequately filled positions, and management cohesion.

This governance inefficiency has impacted all three areas of an ETBPAs triple bottom line: economic development, social development, and ecological sustainability. Economic development in the reserve has been hindered by government underfunding, causing alternative avenues of revenue to be injected into the reserve via the institutional entrepreneurship of the MFC. Although it forms part of MGR's main objective, social development has seemingly been under-prioritised in the reserve,

leaving its local community members in low-skilled jobs without any opportunity for skills development and career improvement. Ecological sustainability has been seemingly disregarded in the pursuit of maximizing the ecotourism product. This could pose serious implications for MGR's sustainability in the future. All of these challenges are indicative of differing values having implications on how decisions are made, prioritised and implemented in the system. The way in which certain aspects of the reserve are valued is also attributed to the scientific knowledge gap through the absence of a qualified ecologist in the system to manage the ecological components in the reserve in a more holistic manner. These findings highlight the importance of scientific knowledge in the system and the need for cohesive management to improve ETPBA system resilience.

The main areas of ecological concern mentioned above relate to the cascading impacts of an unmanaged overpopulation of elephants. There is an evident hesitation to control the elephant population out of fear of how this might impact the ecotourism product of MGR. However, the overpopulation of elephants in an already heavily degraded fenced system is perceived by OSCMs to create adverse feedbacks resulting in further land degradation, a decrease in flora biodiversity, and a negative impact on food availability for prey and predator species. Therefore, by continuing to attempt to manage the ecological system in an ecotourism focused manner, the ecological integrity of the system is failing and will eventually be unable to support the ecotourism product in the future if no intervention is made in its current trajectory.

These findings contribute to the broader literature surrounding the issues face by many ETBPAs in managing their charismatic and value species populations. This study also poses implications for ETBPAs to really consider the trade-offs between maximizing short term ecotourism benefits at the expense of long terms ecological sustainability. This is because the decline in ecological sustainability of the system will ultimately hinder ETBPA's ecotourism product, if not managed correctly.

These findings also indicate the importance of harnessing the perceptions and values of OSCMs who are entrenched in the system to better understand the feedbacks in the system in real-time. These perceptions can potentially create a more efficient management approach through earlier identification of potential issues (Berkes 2002; Gaymer et al. 2014; Agyeman 2014; Selier et al. 2016, 2018). These findings create

further implications for ETPAs to investigate the roles that different values play in making, prioritising and implementing management decisions in ETBPAs as differing values and strategic agency have shown to play a major role in how MGR is managed.

# CHAPTER 4

# PERCEPTIONS SURROUNDING MADIKWE GAME RESERVE'S MANAGEMENT RESPONSE TO CLIMATE CHANGE

## 4.1. INTRODUCTION

Climate change response management is becoming an increasing necessity of ecotourism based protected areas (ETBPAs) (Geyer et al. 2017; Berger et al. 2019; Day and Noakes 2021). Climate change impacts on ETBPAs are multifaceted, compounding and create ecological and ecotourism challenges (Chin et al. 2019; Jamaliah and Powell, 2019). These impacts create compounding impacts for the ecological system of ETBPAs by altering landscapes through land degradation, water resource availability through precipitation variability and a cascading impact on biodiversity (Hannah et al. 2005; Day and Noakes 2021; IPCC 2022). Climate and weather play a major role in holiday maker decisions. Therefore, climate change poses challenges for an ETBPA's tourist attraction potential should climate and weather experience unfavourable changes (Day and Noakes 2021).

Despite climate change being a major risk factor and increasing ETBPA vulnerability, the literature indicates that there is a clear lack of knowledge in ETBPA management regarding climate change impacts and appropriate ways to respond to them (Agyeman 2014; Baird et al. 2014). However, on-site community members (OSCMs) of ETBPAs experience system impacts in 'real-time' (Berkes 2002). Therefore, they are likely to provide a better bottom-up understanding of the system. If leveraged correctly, this understanding can be a valuable resource in curating system-tailored responses to climate change impacts (Gaymer et al. 2014).

The presence of long-established on-site community members (OSCMs) in Madikwe Game Reserve (MGR) provides a foundation of knowledge regarding the impacts and feedbacks experienced in the system over time (Agyeman 2014; Abukari and Mwalyosi 2020). This knowledge is particularly useful in potentially identifying how MGR has been impacted by climate change. I argue that harnessing these valuable insights of how the system has been impacted by climate change and how MGR

management has responded to these impacts can curate a better bottom-up understanding of MGRs resilience against climate change impacts. This understanding can also assist in identifying what implications this may hold for MGR's future sustainability. Using MGR as a case study, this can create implications for improving an ETBPA's management efficacy of climate change responses to promote the protected area's (PA's) sustainability, resilience, and longevity through system-tailored suggestions. Therefore, this chapter of the study aims to capture the bottom-up understanding of climate change impacts in MGR and its management of climate change impacts currently and in the future. This is investigated through the objectives of:

1) To identify OSCM perceptions of climate change and its management in the reserve both currently and in the future
2) To understand perceptions and priorities of OSCMs in the management of climate change responses

## 4.2. METHODS

The data were obtained through in-person interviews of 31 MGR OSCMs. The data then underwent both qualitative and quantitative analysis. The data were qualitatively analysed using thematic analysis theory. Consequently, the interview data underwent thematic coding where main themes emerged and were analysed following the six-phase thematic analysis method as recommended by Braun and Clarke (2006) (see Chapter 2). In addition to thematic analysis, emerging themes were categorised in line with the different research questions of this studies. Frequency counts were conducted on the emerging themes and tabulated to provide a quantitative aspect to the data analysis (Pluye and Hong 2014).

## 4.3. RESULTS

### 4.3.1. PERCEPTIONS ABOUT CLIMATE CHANGE IN MADIKWE GAME (OBJECTIVE 3)

*"Everything that's related to climate change has the effect of being able to create a nightmare"* (P2).

This section of the data chapter unpacks the findings relating to objective 3 by identifying OSCM perceptions of climate change and its management in the reserve both currently and in the future. Most participants (n=28; 90.32%) are of the perception that there is already the presence of climate change impacts felt in the MGR system, with remainder unsure (n=1; 3.23%) or indicating it is not yet evident (n=2; 6;46%).

Those that could not identify climate change impacts attribute this to elephant impacts obscuring the effects of longer acting climate change. There is also some uncertainty as to how climate change impacts relate to more immediate management challenges the reserve faces.

- "*In my opinion, I wouldn't necessarily look at the trees, like [decline in big tree density], as* climate change *I would look at that as an elephant problem. But that's maybe because no one's quite explained to me how that would all fit together."* (P4).
- "*The elephants have made a much bigger change than the weather"* (P15).
- *"Climate change is, to me, it's not such an issue as to maintenance"* (P9).
- *"My concern is not climate change. My concern is, if we don't do maintenance, then climate change will definitely have an influence. Because if there's maintenance, you adapt according to how the environment changes. And then* climate change *won't have an impact*" (P26).

However, some participants are of the opinion that a change in the climate and environment is a seven-year natural pattern, rather than directional climate change:

- *"We have gone through a seven-year drought, but I don't know what is to blame for that if you can say it is climate change or just a natural cycle*" (P21);

- *"The rain and drought go in cycles, like seven-year cycles, normally. So, I am not sure if this is related to climate change or if this is just your normal patterns. So, I don't think it has, maybe to a lesser extent but not to the extreme." (P13)*.

Those who perceive a presence of climate change in the MGR system identified 11 impacts (n=48), with one person (2.08%) being unable to identify any impacts specifically (Figure 4.1). The most prevalent perception of climate change impacts in MGR related to drought (n=15; 31.91%) and its associated symptoms, namely: an increase in temperatures (n=9; 19.15%); change in precipitation variability (n=7; 14.89%); and a perceived pressure on water resource availability (n=6; 12.77%). *"I feel that we are getting less rain and the temperatures are much higher it never used to be this hot in the Summers. we are now experiencing high 30s and 40s [degrees Celsius]"* (P2).

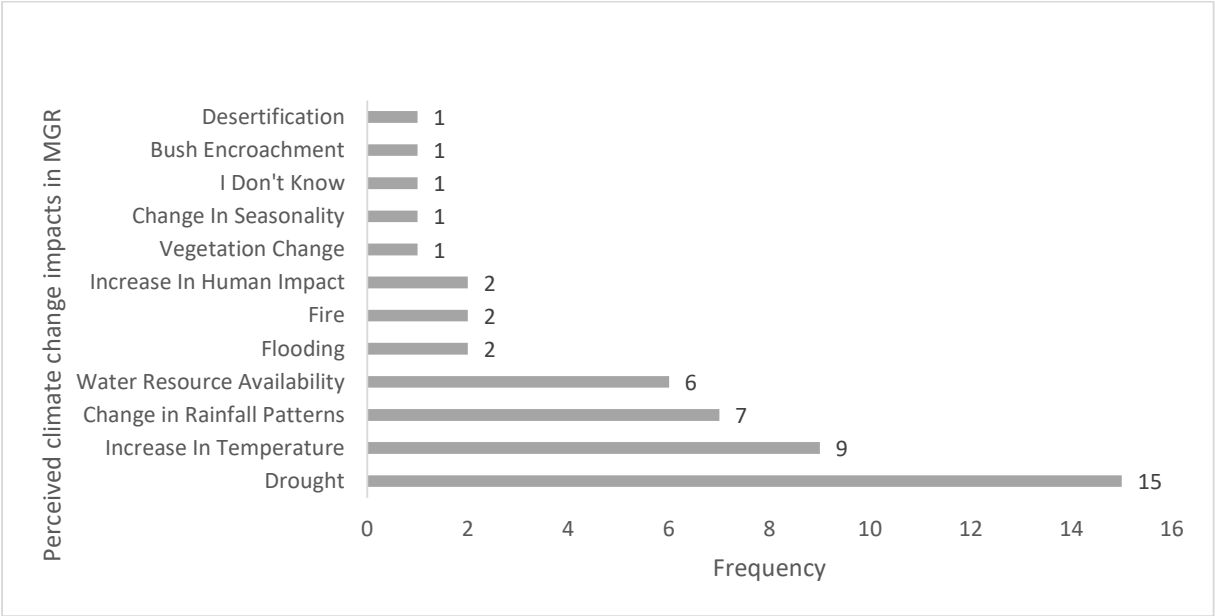


**Figure 4.1:** Frequencies (n= 48) of 12 themes relating to different climate change impacts in Madikwe Game Reserve as identified by 31 participants' perceptions

Drought and its accompanying symptoms mentioned above (increase in temperature, precipitation variability and pressure on water resources) are all seen to have adverse impacts on the vegetation and wildlife in MGR. The lack of food availability for herbivores is particularly seen as causing cascading starvation impacts for prey and predator species (P6).

Precipitation variation has caused a notable shift in rainy season month expectancy resulting in rain being *"two or three months behind,"* (P28). With some participants indicating the cascading impact on birthing and mating seasons of herbivores: *"instead of being born in late September or October, our impalas drop in December. Like now, there should be baby impalas running around but there isn't" (P28).*

#### 4.3.1.1. *FUTURE CLIMATE CHANGE CONCERNS*

After identifying how climate change impacts are perceived in the MGR system, participants then identified how they predicted MGR might be impacted by climate change in the future (n=45). The top three responses remain: increase in frequency and intensity of drought events (n=11; 24.44%), increase in temperature (n=9; 20%) and water resource availability (n=8; 17.78%) (Figure 4.2).

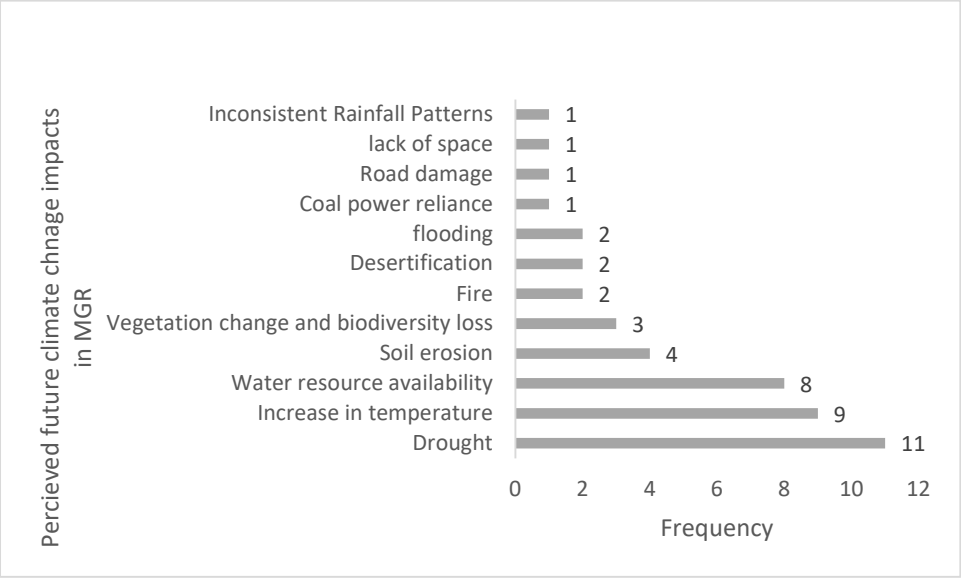


**Figure 4.2**: Frequencies (n=45) of 12 themes relating to future climate change impacts in Madikwe Game Reserve as identified by 31 participants' perceptions

Some participants are of the view that, should the status quo of MGR's current ecological sustainability management trajectory remain unchanged, there may be a potential ecological crisis and MGR's ecotourism product will cease to exist. "I would say that if we don't get enough rain that we will have drought, death of animals*, meaning that tourism will be impacted. If we lose all of our wildlife, there won't be any business in Madikwe, so we need to do something."* (P2).

Management of water resources is perceived by participants to be of utmost importance in protecting the tourism interests, and by extension viability of the reserve in the face of increasing intensity of climate change impacts:

*"The water supply is very important because of course it also affects the vegetation and food supply which will in turn set off the impact on the animals."*(P12). The first major signs of water scarcity will be expressed through the conditions of the herbivores. *"It's a problem for your browsers. I think the problem is that we have a lot of browsers in MGR and the problem is that if it is dry, all of the leaves of the trees are gone and then tannin comes in and then your kudus and giraffe get tannin poisoning"* (P14).

In terms of tourism, many participants think the impact of increased temperatures could have a negative effect on the number of international tourists visiting the reserve. *"Most of our clients are from Europe so they prefer average temperatures so the higher the temperature gets; I don't think the guests will prefer those kinds of temperatures and the increase in heat also increases the amount of insects and some might be harmful to people and animals"* (P4).

#### 4.3.1.2. *CLIMATE CHANGE RESPONSE PLANS*

Taking into consideration the perceptions surrounding already present climate change impacts and a fear of future climate change impacts in the MGR, there seems to be a concerning lack of climate change management response plans in place. Out of 31 participants, 77% (n= 24) are unaware of any climate change response plans currently implemented in MGR. The remaining 23% participants (n= 7) identified the presence of Working on Fire (n=6), Working on Wetlands (n=1) and bush clearing (Figure 4.3), response plans whose activities can help with climate change adaptation.

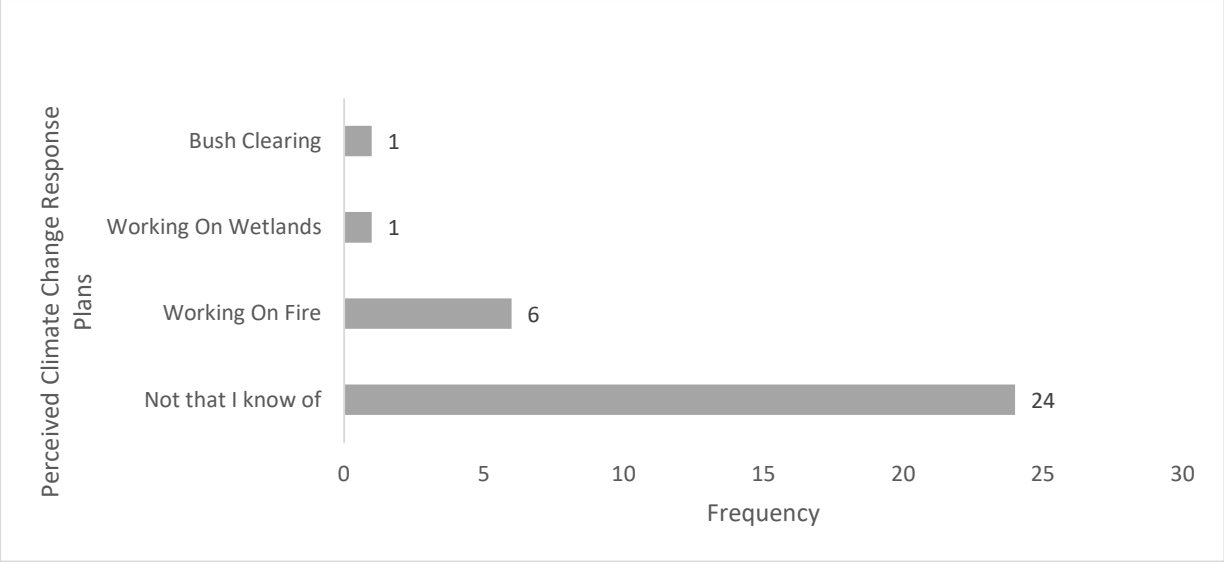


**Figure 4.3:** Frequencies (n=32) of four themes relating to the presence of climate change response plans as identified by 31 participants' perceptions

Although drought is perceived as the main future climate change fear, there seems to be a notable lack of climate change response plans or protocols in case of emergencies arising from climate change events (P28). There is also the issue of lack of maintenance of MGR infrastructure such as dams could exacerbate the impacts of intensive climate change events. *"we have inconsistent rain patterns now and our lack of response to erosion in a lot of areas might result in the reserve being more damaged which might end up causing flooding in the area so it might also be one other thing that one would actually worry more about"* (P7).

Those who have identified the presence of climate change response plans show a lack of understanding of how they are implemented in the system. The first response plan that is seemingly present in the MGR system is Working On Fire.

Working On Fire is a government organization that acts as firefighters in the reserve and assist in removing invasive plant species to create resilience against fires in the reserve (P16). However, Participant 7 indicates that Working On Fire does not work on weekends because they don't get paid overtime "*So if there is a fire over a weekend, the lodge staff fight the fires".*

Although Working on Fire deals with bush clearing, it is not viewed as the sole actor in the bush clearing role *"The bush clearing is also sponsored by the MFC [Madikwe*

*Futures Company], there are two big bush cutting machines that are sponsored by the MFC, not the government."* (P5).

Working For Wetlands was only mentioned by one participant (n=1; 3.23%). This participant states their involvement in the reserve depends on funding. *"As they get funding, they come and where there is bad erosion they come in and try fix it to prevent erosion in the long term*" (P7).

#### 4.3.1.3. *CLIMATE CHANGE AWARENESS*

Participants agreed that climate change is not being actively considered. It is unclear as to whether this is due to a lack of knowledge or capacity amongst park management to dedicate resources to implementing climate change response plans. *"Some people think that global warming and climate change are the same thing and already you can see there is an education problem right there and then. So, if people don't know what you are talking about how are you going to fix it?"* (P17).

Participant 11 was of the opinion that management acts in a way that they are *"not looking to change the climate but workaround specifics that contribute to that"* which implies a more reactive management strategy than an active climate change strategy. Honorary officers (HOs) are seen to be dealing with climate change issues through their pseudo-ecologist role, but not as a specific area of concern *"there is definitely a role that is played by the HOs in the aspects of climate change but not necessarily dealing with climate change, but it is a conscious thing that everyone is concerned about"* (P23).

### 4.3.2. UNDERSTANDING CLIMATE CHANGE MANAGEMENT PRIORITIES IN THE SYSTEM (OBJECTIVE 4)

This section of the data chapter unpacks the findings relating to objective 4 by understanding OSCM priorities for managing MGR climate change responses in the future. The final stage of the interview required participants to indicate what climate change response plans they would implement in the reserve. A total of 22 (n=61) topics were suggested, with participants being allowed to provide more than one. The main recommendations related to: Water conservation strategies (n=12;19.7%);

employing a dedicated climate change team (n=10; 16.4%); Renewable energy source implementation for lodges (n=6; 9.8%) (Table 4.1).

**Table 4.1:** Table of participant recommendations for climate change response plans in Madikwe Game Reserve

| Recommended Climate Change Response Plan | Frequency Count |
|---|---|
| Water conservation strategies (general) | 12 |
| Employ climate change team | 10 |
| Renewable energy source implementation for lodges | 6 |
| Elephant population control | 4 |
| Electric vehicles | 3 |
| Fire control | 3 |
| Eco-friendly lodges | 3 |
| Bush clearing | 3 |
| Wildlife population control (general) | 2 |
| Road network focus | 2 |
| Climate change awareness campaign | 2 |
| Grey water systems | 1 |
| Waste Management | 2 |
| Rotational tree planting | 1 |
| Drought plans | 1 |
| Strategic off-roading | 1 |
| Land expansion | 1 |
| Employ Ecologist | 1 |
| Virtual drives | 1 |
| Erosion prevention | 1 |
| I don’t know | 1 |

The recommendation of water conservation strategies (n= 12; 19.67%) is founded on the fear of water resource availability during droughts: *" if it is going to become more drier, we are going to have to have a look at how we manage water, fixing the dams and making them a bit deeper so that they hold more water and maintaining those water levels, looking at the underground water table and managing that and seeing where we have boreholes. It all depends on which way these models go. But I think the first thing is you're going to need to create awareness and start looking at where you are going to go" (P2).*

The recommendation to employ a dedicated climate change response team (n=10; 16.39%) and improve climate change education (n=2; 3.28%) seems to come from the notion that there is a lack of awareness and education surrounding climate change in the reserve, especially amongst management (P13).

*"Because sometimes people notice something that may relate to a big climate change or sustainability issue, but they do not act on that observation because they do not have the knowledge about it - which I feel is a wasted opportunity of information and its usage"* (P16).

Some participants are still of the opinion that the most effective way to deal with climate change impacts is through improved elephant management (n=4; 6.56%)*" I would go back to the elephants and say, it doesn't help if climate change is going to affect our rainfall, that's obviously going to affect our vegetation growth, it doesn't help if you've got an overpopulation of the elephants destroying all of that "* (P22). *"I want to prioritise bush clearing and then to also have the control over the carrying capacity of the reserve, particularly the elephants in the reserve because that is something that can be easily noticed."* (P1).

Participants note various ways in which lodges should be more sustainable and eco-friendlier (n=3; 4.92%) and getting more *"off the grid"* (P10) (n=6; 9.84%). These suggestions include "*focus on waste management* (n=2; 3,28 %)*, try get all lodges to use less and less plastic. If everyone does small things, then it will make a big difference at the end of the day*" (P3). *"Introduce electric vehicles* (n=3; 4.92%) *and I would love to see the lodges implementing solar panel systems, so they don't produce any gas."* (P6).

## 4.4. DISCUSSION

This section discusses the findings of objective (3) identifying on-site community member (OSCM) perceptions of climate change and its management in the reserve both currently and in the future and objective (4) namely, to understand perceptions and priorities of OSCMs in the management of climate change responses. The main findings of objective three indicate that participants are aware of climate change impacts in Madikwe Game Reserve (MGR) and mainly attribute this to drought which is also a prevalent fear when considering future climate change impacts in the system.

However, the findings of this study also indicate a lack of knowledge surrounding climate change and methods to adapt to and mitigate the impacts of climate change. This creates serious implications for MGR's sustainability and resilience in facing future climate change impacts (Kaján and Saarinen 2013; Cumming and Allen 2017). The findings of objective four indicate that OSCMs wish to prioritise water resource safeguarding and employing a dedicated climate change response team in the reserve to deal with climate change issues. These priorities further indicate a fear of drought and lack of awareness in tackling climate change in the MGR system.

### 4.4.1 UNDERSTANDING OF CLIMATE CHANGE IN MADIKWE GAME RESERVE

Climate change is becoming an increasingly integral part of ecotourism based protected area (ETBPA) management (van Wilgen 2009; Bryan et al. 2009; Lopoukhine et al. 2012; Jørgensen and Termansen 2016; Devisscher et al. 2016; Hobday et al. 2018; Nana et al. 2019; Dube and Nhamo 2020; Rittelmeyer 2020). Climate and weather have major implications for an ETBPA's tourist-attraction potential (Chin et al. 2019; Pang et al. 2013). This study demonstrates a surprising overall lack of awareness and knowledge surrounding climate change among the participants. This is particularly noteworthy as these are individuals who have entrenched their professional and private life into a social-ecological system that is vulnerable to climate change impacts and whose vulnerability could have major implications for their livelihoods (Armatas et al. 2016; Jamaliah and Powell 2019; IPCC 2022). This is a common trend amongst ETBPAs and that there is a serious need to

change this narrative in order to safeguard ecosystem services and ETBPA business models in years to come (Chin et al. 2019).

Most participants indicated the presence of climate change impacts in the system relating to rainfall variability and severe drought. However, some participants linked these climatic experiences to what they considered as a ‘normal’ seven-year drought cycle. This climatic cycle to which participants are referring is seemingly related to the climatic anomaly known as El Nino Southern Oscillation (ENSO) (Pomposi et al. 2018; Hao et al. 2020). Previous literature has shown this anomaly to be a major driver of precipitation variability in Southern Africa characterised through intensive wet and dry events (Pomposi et al. 2018).

In 2021, participants noted uncharacteristically large amounts of rain in the system, giving some hope that the drought cycle is coming to an end. However, the latest IPCC report (2022) and those preceding it, have provided strong cautions to the Southern African region of more intensive and frequent periods of drought, with heightened temperatures in the near future. This suggests there is a need for swift climate change adaptation and mitigation responses to be implemented into the integral parts of Southern Africa PA management in order to safeguard ecosystem services and the people who depend on them for survival (IPCC 2022).

The drivers of climate change and their resulting impacts on the system can be daunting to tackle (Day and Noakes 2021), with many participants indicating they are aware of a climate change presence in the system, but they don’t know where to begin to respond to it. This resonates with the common trend in literature which shows that those involved ETBPAs, particularly those involved in the business sector of the system, generally experience a lack of climate change adaptation and mitigation knowledge (Chin et al. 2019; Jamaliah and Powell, 2019; Kaján and Saarinen, 2013). However, if those involved in management decisions lack the knowledge to identify causal connections between climate change and its impacts on the ETBPA system, many opportunities to enact on adaptive responses fail to be recognised (Mkiramweni et al. 2016). Therefore, some of the main contributing factors of ETBPA vulnerability lies in its management’s knowledge and awareness of how to respond to climate change impacts (Geyer et al. 2017).

### 4.4.2 CLIMATE CHANGE IMPACTS IN MADIKWE GAME RESERVE

Through the findings of this study, impacts identified in MGR have notably surrounded issues relating to drought and its accompanying changes in precipitation variability, temperature and resulting water resource scarcity in the system. MGR is particularly vulnerable to climate change impacts compounding ecological sustainability and biodiversity challenges already created by the reserve's agricultural land use legacy. (Madikwe Development Task Team 1997; Bürgi et al. 2017; Mausolf et al. 2018).

When discussing the issues of climate change, many participants have linked climate change impacts to elephant herbivory destruction. Some participants attributed the change in landscape (particularly desertification) to elephant herbivory destruction rather than climate change. Others highlighted that elephant overpopulation and their resulting destruction as the greatest environmental issue that the reserve is facing and that it needs to be tended to first. These participants tend to look at elephant management as a required climate change response. There is the perception among participants that elephants have impacted the landscape more than climate change, therefore elephant population control would be an appropriate climate change response plan. This is based on the notion that overpopulation of elephants and climate change are two drivers of change in the system that are decreasing the system's resilience and sustainability.

These finding in the study show that there needs to be more emphasis on the crucial importance of climate change impact awareness and knowledge in ETBPA management (Wyborn 2009; Kaján and Saarinen 2013; Geyer et al. 2017). Elephant herbivory naturally alters habitats (Pringle 2008; Scheiter and Higgins 2012). However, being agents of habitat creation and alteration (Pringle 2008), elephants can have negative cascading consequences on vegetation and biodiversity if they are not managed correctly (Clemen et al. 2021).

Studies conducted by Scheiter and Higgins (2012) indicate that elephants have a lesser impact on ecosystem indicators than fire and climate change. Managing social-ecological systems like ETBPAs means that it is very difficult to identify a single attributing factor to land degradation and other sustainability limiting factors (Dologlou and Katsoni 2016; Itzkin et al. 2021). Therefore, although elephant herbivory has been attributed to land degradation and biodiversity issues, it cannot be viewed as an

isolated issue. Elephant herbivory should rather be viewed as a compounding driver of change in the climate change impacted system. Therefore, a transdisciplinary adaptive and holistic approach needs to be adopted to tackle sustainability issues in ETBPAs. This is because climate change adaptation and mitigation does not happen in isolation but is a suite of interlinked cross sectoral responses (Roux et al. 2017; Marshall et al. 2018). However, the capacity for MGR, like other ETBPAs (Bryan et al. 2009; Chin et al. 2019; Geyer et al. 2017; Howes et al., 2015) to have this approach is limited by the lack of climate change impact adaptation and mitigation knowledge.

The findings of this study have highlighted the importance of climate and weather in MGR's tourist attraction potential. The increase in temperatures and precipitation variability in MGR has been a cause for concern not only for the environment but for fears that it may deter a large portion of high-paying international guests, mainly hailing from the colder northern hemisphere regions. The reliance on favourable climates is shown in the literature to be an integral factor of ETBPA tourist attraction potential (Jamaliah and Powell 2019; Dube and Nhamo 2020; Day and Noakes 2021). Therefore, ETBPAs like MGR will most likely have to re-evaluate their business model if the climate becomes unfavourable to its intended tourist market (Jamaliah and Powell 2019; Day and Noakes 2021). This unfavorability is not only considered in a sense of guest comfortability in terms of temperature and weather but of habitat suitability for its charismatic species as a tourist attraction (Selier et al. 2018; Rashidi et al. 2018; Kanagaraj et al. 2019).

Other participants have noted that the change in seasonality has impacted wildlife interactions, mainly attributing this to a shift in mating and birthing seasons amongst herbivores, primarily impalas, which supports the findings of the study conducted by English et al. (2012). This impact could pose wildlife population challenges and potentially alter tourist attraction potential for ETBPAs that rely on birthing seasons for more frequent predator-prey interactions for game-viewing (English et al. 2012; Pang et al. 2013; Dologlou and Katsoni 2016; Dube and Nhamo 2020).

These concerns surrounding the change in seasonality are not without reason. Particiants have noted that previous drought periods in MGR have become so intensive that it has negatively impacted the landscape and created a food and water shortage for the animals, ultimately starving some of the prey species. There is a fear

that not enough has been done to prepare for this issue should it arise again. This highlights a common challenge amongst ETBPAs that there needs to be more focus surrounding climate change impact adaptation and mitigation (Stein et al. 2013; Geyer et al. 2017).

### 4.4.3. PERCEPTIONS SURROUNDING MADIKWE GAME RESERVE'S MANAGEMENT RESPONSES TO CLIMATE CHANGE

Most of the participants were not aware of any climate change response plans being present in the MGR system. Similarly, there seems to be no mention of climate change specific responses in any of the available management plans for MGR between 1997 and 2020 (Madikwe Development Task Team 1997; ICS 2006; North West Parks Board 2020). This is highly concerning as participants have indicated that MGR is evidently vulnerable to climate change impacts which pose major implications for its future sustainability and viability. These findings contribute to existing literature by illustrating a lack of climate change emphasis in ETBPA management (Dube and Nhamo 2020; Day and Noakes 2021). These findings further highlight the need for a stronger more active approach to climate change responses in ETBPAs, most of which have already faced climate change impacts (Bryan et al. 2009; Kaján and Saarinen 2013; Dube and Nhamo 2020).

Although the findings of this study indicated that most participants were unaware of any climate change response plans, few mentioned the presence of Working On Fire. However, there was little understanding of their functions. Working On Fire is a government funded initiative aimed at creating socio-economic upliftment through job-creation and resilience in and around PAs (Working on Fire 2022). This is achieved through education programs and skills development surrounding fire prevention (Working on Fire, 2022). However, participants noted that the only noticeable act of Working On Fire in MGR can be seen through occasional bush clearing and being constantly on stand by for any fire outbreaks.

Interestingly, there seems to be a stark difference in the effectiveness of volunteer work versus the effectiveness of job-position imposed duty. Whilst strategic agency has been present in the system through a sense of place, passion for conservation, and safeguarding of the ecotourism product (Westley et al. 2013; Werbeloff et al.

2016), the findings of this study indicate that the Working On Fire group does not seem to display the same effectiveness. This is primarily seen when looking at behaviours over the weekend. Although the people at Working On Fire are on-site and in the system, there have been instances of fires occurring on weekends about which participants have claimed they had to fight the fires in their personal capacity as Working On Fire staff would not assist. Participants have attributed this to a lack of over time payment. Therefore, in theory, Working On Fire (and to a lesser extent, Working For Wetlands, a similar government programme with less visibility in the park) should be providing better resilience to the reserve but have notably not created much positive impact, potentially supporting the validity of OSCMs concerns surrounding a lack of climate change responses mentioned previously.

The contrast between Working On Fire and the OSCMs' dedication to safeguard the reserve calls for greater research looking at the effectiveness of volunteer work versus paid work when it comes to sustainability. This contrast of dedication highlights the diversity of values and priorities found within MGR. Those who extinguished fires when it was not their role to do so, demonstrated strategic agency to safeguard the lodges and habitats in MGR (Kornberger 2017; Arias-Arévalo et al. 2017b; Novalia et al. 2018). The values surrounding this can be multifaceted either through intrinsically wanting to protect the environment or instrumentally wanting to safeguard lodges to maintain asset and job security (Stern and Dietz 1994; Arias-Arévalo et al. 2017b). This further highlights the need to assess what roles different values play in ETBPA management decisions (Jones et al. 2016; Ranger et al. 2016; Arias-Arévalo et al. 2017).

### 4.4.4. PARTICIPANT PRIORITIES IN THE MADIKWE GAME RESERVE SYSTEM

The lack of climate change management responses in MGR seems to be indicative of a common issue in ETBPAs caused by a lack of sufficient knowledge and capacity of management actors in the system to provide effective climate change management responses (Kaján and Saarinen 2013; Werbeloff et al. 2016). This also speaks to the current ad hoc management approach of MGR which participants suggest needs to to change from its current reactive management approach to a more active one to safeguard the reserve's sustainability. This shows what participants would prioritise if

they were in charge of management responses in the reserve in an attempt to improve the reserve's resilience in the face of climate change. These priorities and recommendations mainly relate to water conservation strategies to safeguard against drought through better maintenance and strategic placing of water points in the reserve as well as implementing eco-friendly grey water systems in lodges to conserve water in the reserve. By prioritising water resource safeguarding, MGR will be better equipped to deal with the climate change impacts of increased frequency and intensity of droughts in the near future, as per the IPCC's (2022) predictions for the area.

Many participants recommended converting lodges into completely renewable energy reliant, eco-friendly state. Participants mentioned solar power, grey water systems, local food harvesting, effective waste management, plastic eradication, and electric cars to minimize the reserve's contribution to climate change drivers. The literature shows that this approach is becoming more and more prominent in ETBPAs (Dorsey et al. 2004). This eco-friendly approach is not only favourable because it increases the resilience and sustainability of lodges, but because it is attractive to the ever increasing environmentally sustainable conscious tourist markets (Lew 1998; Dorsey et al. 2004).

Although these participant priorities are valid and fair, they display a focus on the ecotourism product rather than bettering the system as a whole. This is a clear reflection of the governance style discussed in Chapter 3. This is indicative of instrumental economic values being prioritised over the intrinsic values of ecosystem safeguarding shown in ETBPAs (Stern and Dietz 1994; Lew 1998; Stern et al. 1999; Anderson et al. 2015; Dologlou and Katsoni 2016; Arias-Arévalo et al. 2017b) Furthermore, the lack of scientifically sound climate change solutions shows the extent of the negative ecological sustainability implications if an appropriately qualified individual is not appointed in the position of ecologist.

Although MGR's ecological sustainability is a major area of concern, the fact that a permanent and qualified ecologist has not been present in the system brings the values and priorities of MGR's management into question. These current priorities also suggest that MGR's management requires a more ecological focus to safeguard its ecological sustainability that will ultimately impact it's ecotourism product longevity. This further suggests that while the strategic agency displayed by members of management are admirable and have certainly helped MGR remain economically

viable, the lack of properly informed decision makers is likely to hinder MGRs ability to adapt and implement effective solutions in the face of climate change.

The lack of awareness and knowledge of climate change adaptation and mitigation responses was also highlighted in most participants opting for a dedicated climate change task force to be implemented in the reserve rather than providing their own climate change adaptation and mitigation specific response plans. Participants viewed this as a panacea for the reserve by having experts come in to solve the climate change issue. But this suggestion could also be indicative of OSCMs feeling overwhelmed with issues they are not sufficiently equipped to handle which supports the finding in Chapter 3.

## 4.5. CONCLUSION

MGR has experienced the negative impact of severe drought in the reserve over the years and is predicted to experience more intense weather events in the future. However, despite this, there seems to be a surprising lack of climate change response plans in MGR or the motivation to create any by its current management. These findings highlight the importance of a more bottom-up understanding of the system. The OSCMs of MGR have illustrated a scientific knowledge gap in the system that needs to be filled, not only that of an ecologist but a role purely dedicated to climate change impact adaptation and mitigation. The suggestion of having a climate change specified role could have positive implications for the sustainability and adaptive management of other ETBPAs, with a dedicated focus on climate change becoming increasingly integral in ETBPA management.

Climate change drivers and impacts on the landscape were sometimes indeterminable or of lesser concern when compared to the sustainability issues surrounding the elephant overpopulation in the reserve. These findings indicate an urgent need to implement more climate change awareness amongst OSCMs so that they are able to identify impacts and suggest management solutions. Alternatively, taking the nature of MGR's current strategic agency fuelled management style into account, increasing this knowledge amongst OSCMs can also increase their capacity to remedy the issue themselves, if possible. Increasing the knowledge surrounding climate change and its cascading impacts could potentially alter the current values and priorities in the system from a ecotourism focus to a more ecologically sustainable one. Therefore, this could

assist in creating more active and adaptive management towards climate change in MGR, which can assist in preparing for more intensive and frequent drought periods predicted to come (IPCC 2022).

# CHAPTER 5

# GENERAL DISCUSSION AND SYNTHESIS

## 5.1. DISCUSSION AND SYNTHESIS OF STUDY FINDINGS

This study aimed to gain a better bottom-up understanding of Madikwe Game Reserve (MGR) as a complex protected area social-ecological system through the perceptions of its on-site community members (OSCMs). This understanding particularly focused on identifying perceptions surrounding: (1) MGR's current areas of management concern and (2) areas of management concern specifically relating to MGR's ecological sustainability. These findings illustrate the status quo of MGR management. This was then followed by identifying perceptions surrounding: (3) climate change and its management in the reserve both currently and in the future and (4) understanding the perceptions and priorities of OSCMs in the management of climate change responses.

Although socio-economic development is considered as the primary objective of MGR, the findings of this indicate that social development in the reserve is seemingly lacking. This indicates that not much has changed since Bologna's (2008) study in the reserve, equating local community members in the villages as 'stick holders' rather than major 'stakeholders', highlighting their noticeable lack of power, involvement, and benefit which they were promised from the reserve over a decade after its inception. Although MGR has now gone into its third decade of operation, participants noticed a lack of local community members in senior management roles. This is concerning as there are currently many vacancies in MGR's key management roles. Furthermore, MGR has been established long enough for them to have skills development programmes that should theoretically be able to educate villagers to the point that they are able to progress up to senior management positions. Therefore, this discrepancy between theory and practice of MGR's supposed main objective brings its management priorities into question. Unfortunately, ecotourism based protected areas' (ETBPAs') tendency of unmet promises to local communities is not uncommon (Cundill et al. 2013; Bennett and Dearden 2014; Thondhlana et al. 2016). Therefore, this poses implications for research to investigate how effective ETBPAs truly are in meeting their promised social development goals for their surrounding local communities.

Findings of the OSCM perceptions surrounding MGR's management status quo (Chapter 3) and climate change management (Chapter 4) illustrated five major similarities between the two data chapters:

1) Management priorities seem to favour ecotourism rather than ecological sustainability
2) A lack of scientific knowledge in the system
3) The need for key management roles to be filled
4) Issues surrounding the overpopulation of elephants
5) Water resource issues

Perceptions are shaped by values (Jarvis et al. 2018). The findings of this study indicated that there were a number of diverse values at play in MGR's system. These values are perceived to have impacted how management decisions were made, prioritised, and implemented. Strategic agency emerged in MGR through its OSCMs that tried to fill the noticeably vital, yet vacant, management role of an ecologist. This strategic agency was fuelled by diverse value systems. Some OSCMs harnessed their strategic agency because they valued the ecological system intrinsically and wanted to protect the environment for ecological sustainability reasons. Others relationally valued the safeguarding of the ecosystem due to their place attachment to the landscape, to protect their home. However, this seemed to be overshadowed by those expressing instrumental values through institutional entrepreneurship and managing the ecological aspects of the reserve with an ecotourism business focus to safeguard their investments and job security. This overshadowing is evident through the way in which ecotourism management was seemingly prioritised over holistic ecological sustainability management. The identification of values playing a major role in how MGR management makes, prioritises and implements decisions has implications for investigating the extent to which personal values play a part in ETBPA management effectiveness.

The absence of an ecologist for almost a decade brings MGR's management priorities into question and exposes a scientific knowledge gap in the system. This knowledge gap is evident in the ecological impacts surrounding the ad hoc strategic agency-fuelled management. This management is seemingly conducted by on-site community members (OSCMs) who do not have the correct qualifications to manage the

ecological aspects of MGR in a holistic and sustainable manner. This is illustrated through the trade-offs between maximizing short term ecotourism and ecological benefits.

The main noticeable implication of this trade-off is the overpopulation of elephants and their cascading impacts on MGR's ecological system's sustainability. Despite the very evident role that elephants have played in increasing land degradation and decreasing biodiversity, there is clear hesitation to implement population control methods. This hesitation is borne out of the fear that any lethal population control methods, such as culling or hunting, will have severe negative implications for MGR's tourist attraction potential. Other control methods were perceived to be too expensive to implement. These fears are not unwarranted as many ETBPAs that have implemented culling or hunting as a form of population control have received negative backlash from the tourism market (Koenig 2007; Shannon et al. 2013; Gressier 2014; Naidoo et al. 2016; Iain J. Gordon 2019; Slotow et al. 2021).

The extent to which MGR's elephant population has (over) expanded has posed some implications for ecological sustainability efforts. The elephant population is currently perceived by participants to be roughly 400% over its carrying capacity of 350 elephants (Madikwe Development Task Team 1997). Although the reserve is showing indicators of ecological decline through its land degradation and biodiversity loss, it does not seem to have depleted in its tourist attraction potential (North West Parks Board 2020). With no clear indication that any elephant population control methods will be implemented soon, this brings about the question of where ETBPA management draws the line when it comes to elephant population control.

The herbivory of elephants allows them to consume a variety of tree and grass species (Chamaillé-Jammes et al. 2007; Pringle 2008), whilst their size also allows them to modify habitats and outcompete smaller animals for food sources (Pringle 2008). Therefore, by the time the elephant population starts to show signs of starvation and die-off that may negatively impact tourist-attraction potential, it may be too late to intervene and rehabilitate the rest of the ecological system (Chamaillé-Jammes et al. 2007; Pringle 2008). Therefore, this has further implications for ETBPAs on how they might prioritise their management focus. How ETBPAs strike a balance between maximizing tourist attraction potential and safeguarding ecological sustainability

needs to be re-evaluated, as their general success is not unequivocal (Arbieu et al. 2017). This balance needs to be considered with the goal of protecting the longevity of the overall system. It is suggested through this study that ecological sustainability needs to have a greater focus to ensure that the ecotourism product does not irreversibly collapse. This ecological sustainability focus is also emphasised as it has major implications for MGR's, as well as other ETBPA's, ability to combat compounding ecological sustainability issues of climate change impacts in the future.

Concerns surrounding current water resource distribution and sustainability around MGR (Chapter 3) are exacerbated when considering the predicted increase in climate change impacts for MGR (Chapter 4) (IPCC 2022). The distribution of water resources throughout the reserve were once again linked to ecotourism prioritization which favoured the north eastern section of the reserve. However, the sustainability of these watering holes was also put into question regarding the impacts of their quantities on wildlife population control and migration. The strategic distribution and maintenance of watering holes in ETBPAs pose major implications for ecological sustainability and wildlife population density and migration (Hayward and Hayward 2012). Participants indicated that there are few pumped and maintained watering holes in the reserve with most being in the north eastern section of the reserve. This poses negative tourist attraction potential for lodges located in the south western regions of the reserve as they are perceived to have less game-viewing potential.

There is a fear that the perceived (and predicted IPCC (2022)) increase in major drought events could increase water challenges in the reserve. This could potentially cause lodges in the south western, and eventually north eastern, parts of the reserve to rethink their viability if they are unable to secure a sustainable source of water to run their businesses. Weather and climate being integral parts of many holiday-maker decisions (Chin et al. 2019; Crompton, 1979; Pang et al. 2013). Therefore, MGR and other ETBPAs are further prompted to consider future business viability when met with climate change impacts on tourist attraction potential.

The issues of drought and water resource availability are also a prevalent point of concern for further land degradation and herbivore food availability in the area, causing major implications for the biodiversity in the reserve. This raises the concern that watering points should be managed and maintained in a drought-focused manner,

thereby allowing MGR to move away from its reactive ad hoc management approach to a more active and adaptive management approach towards drought events which will create space to mitigate water resource issues in the future. The identification of MGR's current water resource management adds to the literature concerning the importance of water hole distribution and maintenance for ETBPAs (Cronje et al. 2005; Muse et al. 2008; Egeru et al. 2015).

This study has contributed to highlighting the importance of bottom-up understandings of ETBPAs. Furthermore, this study has identified management issues that are seemingly decreasing MGR's ecological sustainability which pose major implications for its ecotourism product viability in the future, especially when faced with increasing climate change impacts. This bottom-up understanding can potentially create a richer knowledge base for management suggestions in the future. By having OSCMs participate in this study anonymously, it seemingly created a safer space to gain a richer bottom-up understanding of the system without the limitations of fear to voice opinions, which was found to be a major concern. This finding in itself suggests that part of the difficulty in gaining a bottom-up understanding of ETBPAs through its OSCMs is the fear to voice opinions regarding management issues (Bowen and Blackmon 2003; Dyne et al. 2003).

The broader implications of this study highlight the knowledge gap surrounding the roles that values play in shaping decisions and interactions in ETBPA management. This would bring more valuable insights to the literature as the influence of human values on environmental management of ETBPAs has to date, been poorly studied (Arias-Arévalo et al. 2017; Castro et al. 2016; Floress et al. 2015; Jones et al. 2016). This study illustrates that OSCM perceptions are an important management resource. However, this resource can be further enriched by addressing knowledge gaps in the system. OSCMs need the knowledge to better understand climate change and ecological impacts and feedbacks. This will assist them to be more well-equipped to identify issues emerging in the system before they become increasingly difficult to handle. The findings of this study further emphasise the importance of scientific knowledge in ETBPAs through the cascading ecological impacts caused by the absence of an ecologist as a key management role.

These findings and resulting recommendations pose direct implications for MGR management specifically as this study has portrayed the OSCM perceptions of the system and posed suggestions for management to consider. Additionally, these findings have direct implications for ETBPA reserve managers in general as it provides a method to curate a better bottom-up understanding of an ETBPA to create more system-tailored management solutions.

## 5.2. RECOMMENDATIONS

The findings of this study have contributed to the literature which discusses the general lack of knowledge in ETBPAs as to how to adapt to and mitigate the impacts of climate change with a particular focus on southern Africa (Chin et al. 2019; Day and Noakes, 2021; Jamaliah and Powell, 2019; Kaján and Saarinen, 2013; Mkiramweni et al. 2016). This is concerning because ETBPAs are particularly vulnerable to climate change as the change in weather, climate, and its cascading impacts on the environment have serious implications for their ecotourism product and tourism attraction potential (Jamaliah and Powell 2019; Day and Noakes 2021).

After synthesising the recommendations of the OSCMs as well as taking the literature surrounding the predicted future climate change impacts for southern Africa into account (Armatas et al. 2016; Chin et al. 2019; Day and Noakes, 2021; Dube and Nhamo, 2020; IPCC, 2022), this study recommends the following research and management recommendations as a way to assist in improving MGR's sustainability, adaptability and resilience for future climate change impacts:

### 5.2.1 MANAGEMENT RECOMMENDATIONS

- Creating an anonymous platform where OSCMs can voice their opinions surrounding areas of management concern and suggestions on how to improve it. This can promote a better bottom-up understanding of the system to provide suggestions to top-down management to assist in identifying where governance inefficiencies lie without the fear of deductive disclosure (Berkes 2002; Bowen and Blackmon 2003; Dyne et al. 2003; Gaymer et al. 2014). This identification of where management goals might need to be reprioritised can impose broader implications for ETBPAs needing to improve their collective management action

against disturbances in the system and increase their resilience (Biggs et al. 2012; Brondizio et al. 2009)

- Although there are multiple values, perceptions, and indigenous and local knowledge in the system at play, there is an evident lack of scientific knowledge in the system. Therefore, it is recommended that MGR includes researchers, social-ecological scientists, and wildlife experts into its decision-making process to increase the system's resilience and increase the richness of its knowledge base when making decisions (Tengö et al. 2014; Cumming et al. 2015).
- Management intervention and restructuring of MGR current system is strongly recommended to increase its governance resilience, particularly through creating and filling more positions which specifically deal with ecological and climate change response management with appropriate individuals.
- Due to the sparseness of MGR's management structure prohibiting any form of mentorship from predecessors, other avenues of mentorship can be explored through workshops hosted by external actors in similar career fields in an attempt to increase the capacity of actors within MGR to fill the gaps more efficiently under current socio-political circumstances (Rodríguez-Rodríguez and Martínez-Vega, 2016).
- As drought was identified in the findings as one of the major climate change concerns for MGR by participants, the implementation of drought mitigation and adaptation responses are encouraged as soon as possible.

### 5.2.2. RESEARCH RECOMMENDATIONS

- Wildlife population management plans need to be created in a way which balances ecotourism and ecological integrity needs for the system (Somgird et al. 2017; Selier et al. 2018; Arbieu et al. 2018). This is recommended as an aid to assist in making more informed decisions regarding wildlife population management.
- The call for ETBPAs to implement adaptive climate change response plans is highly encouraged (Chin et al. 2019; IPCC, 2022). Implementing climate change awareness workshops in MGR as well as other ETBPAs is recommended to increase the knowledge capacity of OSCMs so as to better identify climate

change impacts in the reserve and provide a climate change-specific platform to deal directly with the issue from multiple informed perceptions.

- Further research should be conducted to understand what roles values play in shaping the management decisions of MGR. A further study of the MGRs system is also encouraged to assess the status of its ecological integrity to provide more tailored recommendations. This should include assessing the ecological integrity of the system in conjunction with the perceptions of the OSCM. This will allow more informed management decisions to be made to increase the sustainability and resilience of the MGR system (Bennett, 2016; Harte, 2001).
- I recommend wider research to be conducted on the effectiveness of bottom-up understandings in ETBPA management.
- I recommend wider research investigating the relationship between the knowledge and values regarding climate change in ETBPA on-site communities and how this impacts the effectiveness of climate change management responses.

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# APPENDICES

## APPENDIX 1: SEMI-STRUCTURED INTERVIEW GUIDE

Key informant interview structure

1. How long have you been part of Madikwe Game Reserve?

2. What role(s) do you play in Madikwe Game Reserve?

3. Are you a permanent resident in Madikwe Game Reserve?

   ◯ Yes
   ◯ No

4. what are the most important management aspects of Madikwe Game Reserve to you personally?
   a. And why?

5. How much influence do you feel you have in the management decisions of Madikwe Game Reserve?

| | 0 | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|---|
| None at all | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | The most |

6. What experiences help shape your input when making decisions about Madikwe Game Reserve?

7. Currently, what management aspects of the reserve are Madikwe Game Reserve management decision-makers most concerned about in general?
   a. And why?

1

8. Which stakeholders/stakeholder groups do you feel have the most influence in Madikwe Game Reserve management decision making processes?
    a. And why?

9. Which stakeholders/stakeholder groups do you feel have the most knowledge about protected area sustainability?
    a. And why?

10. Do you feel that there are any individuals who go above and beyond their professional role to help improve Madikwe Game Reserve's overall sustainability?
    a. If so, and if you are comfortable identifying them, who are these individuals?

11. "*Some management plans are focused on more than others to benefit the personal priorities of the people involved in management decisions and not necessarily on what is in the best interest of Madikwe Game Reserve*"

lease rate your response to the above statement

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| trongly Disagree | ◯ | ◯ | ◯ | ◯ | ◯ | Strongly Agree |

12. What is currently the most pressing management concern specifically regarding the sustainability of Madikwe Game Reserve?
    a. And why?

13. How would you describe climate change?

14. How well do you feel you understand climate change impacts on Protected Area management?

| | 0 | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|---|
| Not at all | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | Expert understanding |

2

15. What is your greatest climate change concern?
    a. And why?

16. Do you think climate change has already impacted Madikwe Game Reserve?
    a. If yes, how?

- ◯ Yes
- ◯ No
- ◯ I don't know

17. Do you feel that climate change impacts will worsen or improve?
    a. And how?

- ◯ Worsen
- ◯ Improve

18. Do you know if Madikwe Game Reserve as any climate change response management plans?
    a. If yes, what are they?

- ◯ Yes
- ◯ No
- ◯ I don't know

19. Do you feel that climate change has impacted or will impact the important aspect(s) of Madikwe Game Reserve that you identified earlier in this interview?
    a. Please explain your answer

- ◯ Yes
- ◯ No
- ◯ I don't know

20. What are your greatest concerns about Madikwe Game Reserve facing climate change in the future?
    a. And why?

21. If you were completely in charge over the management decisions of Madikwe Game Reserve, what climate change response plans would you put into place?
    a. And why?

22. Is there anything else that you would like to add?

23. Can you suggest a person (and their contact details) for me to interview who would be beneficial for my study?

## APPENDIX 2: INFORMATION SHEET




Date

Hello,

**Re: Invitation to participate in research on the impact of perceptions, knowledge backgrounds and influence levels on Madikwe Game Reserve management.**

**Project and Researcher details:** My name is Amy Galvao and I am a Masters student in the school of Animal, Plant and Environmental Sciences at the University of the Witwatersrand, Johannesburg. My research seeks to investigate what people with different knowledge backgrounds and influence levels within the different management positions of Madikwe Game Reserve prioritize, and how this impacts protected area management both currently and in the face of future climate change events. This study is supervised by Professor W Twine, Dr K Coetzer-Hanack and Dr A De Vos. This project has been deemed 'minimal risk' status by the University Human Research Ethics Committee (Non-Medical) (H20/07/11) and has been approved by North West Parks Board.

**Details of Participation:** As part of this project, I would like to invite you to take part in an interview which will take about an hour to complete either conducted in-person or electronically. This study involves interviewing multiple people from all levels of management hierarchy. The only identifier I wish to use from our interview will be what level of management hierarchy (strategic, operational, tactical) you generally fall under. The interview will be completely confidential, and anonymity will be maintained to the fullest extent possible. Due to the small population involved in Madikwe Game Reserve management, I would like to highlight that there is a small risk of deductive disclosure, i.e. people may be able to infer or ‘figure out’ identities. To avoid this risk, quotes from your interview will be assigned a random number and will be paraphrased, if necessary, to avoid any personal identifiers. Results from the different levels of

management hierarchy will be aggregated to further avoid these risks. You will be sent the full report and results summary once the study has been completed.

**Risks and Benefits of Participation**: You will not receive any material or economic benefits from participation and will not be penalised if you do not choose to participate or if you withdraw from the study. However, this study is conducted in the hopes that your participation in the research allows you the opportunity to share your personal knowledge and perceptions of Madikwe Game Reserve, and that in doing so, you will indirectly benefit through improved management practices.

**The Interview Process:** Remote interviews will be conducted via online platforms such as Zoom / Skype, or telephonically at my cost. If you would prefer to have an in-person interview, the interview will run in accordance with all COVID-19 social-distancing safety guidelines. The interview can be held at your premises in Madikwe Game Reserve or at another venue suitable to you. Attached to this interview request is a link to a consent form as well as a breakdown of the interview questions so that you may view the participation details at your convenience. Please kindly fill out the consent form before the interview takes place. Please feel free to indicate if there are any questions that you are uncomfortable answering. If there are some questions that you do not wish to answer, we will simply move on to the next question during the interview. If you experience any discomfort at any point in this process, we will stop the interview or resume another time. With your permission, I would also like to record the interview using a digital device.

You may withdraw from this study at a later stage. You will have seven (7) days after your interview has been completed to withdraw from the study by indicating so to me by email or telephone call.

**Potential research outputs**: If you have any questions during/afterwards about this research, feel free to contact my supervisors or me on the details listed below. The information that you share with me will be stored on a password protected laptop and stored in a Google Drive Folder only accessible by myself and my supervisors. After this study has been completed, these data may be stored for follow-up studies, authored by myself or my supervisors, which will require their own Human Research Ethics Committee approval. Any sharing of the findings of this research outside of the research team (e.g. to North West Parks), will only be in anonymised form, with all

identifying information removed. Once the study is completed, the resulting report will be available online through the university library website. This report will be published in an academic journal and be presented at academic conferences and to the Madikwe Game Reserve management body. If you have any concerns regarding the ethical procedures of this study, you are welcome to contact my supervisors, or the University Human Research Ethics Committee (Non-Medical) telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Thank you for taking the time to read about my research, I hope you will consider being involved! If you would like to participate in this study, please respond to this email with your preferred interview method and we can organize a date and time that suits you.

Yours sincerely,

Amy Galvao

2412888@students.wits.ac.za,

084 883 2716

**Consent Form Link**:

https://forms.gle/HJwYrprXyaL5u76D9

Supervisors

Professor Wayne Twine Dr Kaera Coetzer-Hanack Dr Alta De Vos

wayne.twine@wits.ac.za kaera.hanack@wits.ac.za a.devos@ru.ac.za

**015 793 7501 011 717 6099 046 603 7003**

## APPENDIX 3: CONSENT FORM

UNIVERSITY OF THE WITWATERSRAND,



# Consent form

Consent form to participate in Amy Galvao's MSc research titled: "Using Madikwe Game Reserve as a case study to investigate the impact of management actor perceptions and positionality on protected area management in the face of climate change".

*Required

Email address *

Your email address

Please provide your name for administrative purposes.

Your name will not be used in any of the research data processes, it is only to used to show that you have agreed to participate in this study

Your answer

Next

UNIVERSITY OF THE WITWATERSRAND,

# Consent form

*Required

## Terms of participation

1. The purpose, benefits and risks of the research have been explained to me and I understand what my participation will involve.
2. I understand that the aim of this project is to investigate how a management actor's personal perceptions, coupled with their knowledge backgrounds and influence on management can impact management priorities in protected areas, both currently and in the face of future climate change events.
3. I understand that should I wish to have a face-to-face interview, that the interview will be compliant with all COVID-19 social distancing safety protocols.
4. I understand that my participation will remain confidential and anonymous to the fullest extent possible.
5. I understand that I will be asked what general management hierarchy level of Madikwe Game Reserve management I generally fall under and that this may lead to the risk of deductive disclosure.
6. I agree that the researcher may use quotes from this interview that will be given a random quote number and will be paraphrased, if necessary, to remove personal identifiers
7. I understand that I will not receive any material or economic benefits from participating in this study and I will not be penalized in any way for not participating in this study or withdrawing at a later stage
8. I have read through the interview questions and have identified whether or not I am comfortable answering certain questions
9. I understand that I can choose to withdraw my responses at a later stage, but that there will be a time-limit beyond which no withdrawals will be permitted.

9.1. I understand the researcher will contact me electronically to notify me of this withdrawal window period closing. I understand that, with a failure to respond and note concerns after 7 days of this notification, I shall remain a part of this study and will not be allowed to withdraw from that moment on.

10. I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by the researcher or her supervisors, subject to their own ethics clearance being obtained.

I have read and understood the Terms of Participation and consent to participate in this research project. *

- ◯ Agree

I agree that the interview may be audio recorded *

- ◯ Yes
- ◯ No

I would like to member check my interview transcript to ensure that I am comfortable with what information will be used in this study *

- ◯ Yes
- ◯ No

A copy of your responses will be emailed to the address that you provided.

Back Submit

Never submit passwords through Google Forms.

# APPENDIX 4: ETHICS CERTIFICATE

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

Research Office

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

| | |
|---|---|
| **CLEARANCE CERTIFICATE** | **PROTOCOL NUMBER: H20/07/11** |
| **PROJECT TITLE** | Using Madikwe Game Reserve as a case study to investigate the impact of management actor perceptions and positionality on protected area management in the face of climate change |
| **INVESTIGATOR(S)** | Miss A Galvao |
| **SCHOOL/DEPARTMENT** | Animal, Plant and Environmental Sciences/ |
| **DATE CONSIDERED** | 24 July 2020 |
| **DECISION OF THE COMMITTEE** | Approved<br>Risk Level: Minimal |
| **EXPIRY DATE** | 07 October 2023 |

**DATE** 08 October 2020 **CHAIRPERSON** _____
(Professor J Knight)

cc: Supervisor : Prof W Twine, Dr K Coetzer-Hanack and Dr A De Vos

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**DECLARATION OF INVESTIGATOR(S)**

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

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

_____ _____/_____/_____
**Signature** **Date**

**PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES**

# APPENDIX 5: NORTH WEST PARKS BOARD RESEARCH PERMIT


**North West Parks Board**
North West Province
Republic of South Africa

Stand 3031
Heritage House,
Cookes Lake,
Mafikeng
P.O.Box 4488
MMABATHO
2735

OFFICE OF THE
Acting Chief Conservation Officer

Tel: +27(18) 397 1500 /
0836548415
Email: hpnel@mweb.co.za


**Me. Amy Galvao**

**University of the Witwatersrand,**

**School of Animal, Plant and Environmental Science**

**Johannesburg,**

**South Africa**

Dear Amy

**Permission to conduct research at Madikwe Game Reserve.**

Your project proposal "Using Madikwe Game Reserve as a case study to investigate the impact of management actor perceptions and positionality on protected area management in the face of climate change" has reference.

The North West Parks Board and specifically Madikwe Game Reserve is in support of your project as it has huge relevance on the information Park management require in managing stakeholder perceptions in the park. As you mentioned, the Madikwe conservation model is reliant on partnerships between government, private sector and communities, and an understanding of the perceptions of these stakeholder groups is important in managing them. It is therefore also important to include the relevant Communal Property Associations in Madikwe.

Permission is herewith granted for you to conduct your research in Madikwe Game Reserve. Madikwe will require your results to be presented to a management forum in the reserve when it is completed. I note your own logistical arrangements and we welcome this, as the research infrastructure of the reserve is already occupied by other projects.

I further invite you to liaise with myself or with the Park manager Mr Moremi Keabetswe should yo have any further enquiries or other requirements. We look forward to the results of your study.

Your sincerely



Pieter Nel
Acting Chief Conservation Officer
North West Parks Board

## APPENDIX 6: AUDIT TRAIL AND JUSTIFICATION FOR METHODOLOGICAL DECISIONS

The focus of the study looked at understanding how Madikwe Game Reserve's (MGR's) current management is perceived by its on-site community members (OSCMs) and what implications this might have for its sustainability and future climate change responses. This focus was intended to capture the diversity of perceptions in MGR's system to potentially provide an intricate bottom-up understanding of the system. This focus was thought to improve the resilience of MGR's governance by potentially identifying management issues in 'real-time' through the on-site community who live and work within MGR and thus are more likely to notice the feedbacks of management decisions in the system. This study intended to provide an insight into where management focus may need reprioritization, especially when considering climate change impacts and the management responses thereof.

- To achieve this aim, the following objectives were formulated:
    - To identify OSCM perceptions of current areas of management concern
        - Research Question 1: What do OSCMs currently perceive to be areas of management concern in MGR?
    - To identify OSCM perceptions of current areas of concern specifically relating to sustainability.
        - Research Question 2: What do OSCMs currently perceive to be areas of management concern that specifically relate to the sustainability of MGR?
    - To identify OSCM perceptions of climate change and its management in the reserve both currently and in the future
        - Research Question 3.1: How do OSCMs perceive current climate change impacts in MGR?
        - Research Question 3.2: How do OSCM perceive current climate change management in MGR?

- Research Question 3.3: How do OSCM perceive climate change to impact MGR in the future?

- To understand perceptions and priorities of OSCMs in the management of climate change responses
    - Research Question 4: What recommendations would OSCMs put into place to assist MGR in improving it's climate change responses in the future?

**Participant selection decisions**

This study was created to fill the research gaps I identified in my previous study (Galvao, et al. 2018)[2]. In my previous study, I had conducted interviews with key role players in MGR's management who have been intrenched in MGR's system for many years and were thought to have a rich and in-depth understanding of the MGR system. I was able identify and purposively sample key role players in my previous study based on my own knowledge of the system because my grandparents and family home had been established in MGR 2002 (see section 2.1.6). I also used snowball sampling in my previous study to identify other key role players that I may not have been aware of. I used the database from my previous study to initially approach participants from my previous study because it was assumed that these people:

- Would be comfortable to participate in a follow up study after already participating in my previous study.
- Would have a rich knowledge base of the system to provide an in-depth perception of MGR's system because they have been part of the system for a long time.
- Would be able to provide contact information of other on-site community members for snowball sampling purposes

This participation selection then expanded across the entire MGR on site community for additional participants. I reached out to other on-site community members using snowball sampling from the interviewed individuals of the current study and contact

[2] This document can be accessed via https://drive.google.com/file/d/1DfdZJWvE87fhPJ3kdRYBAzzPYSHkNi68/view?usp=sharing

information that was readily available on the websites of all of MGR's lodges and the official NWPB website (Table A6.1).

**Table (A6.1):** Table of email contacts for lodges in Madikwe Game Reserve and the official North West Parks Board

| **Name** | **Email** |
|---|---|
| North West Parks Board | info@nwpb.org.za |
| Bosman Lodge | lodgebosman@gmail.com |
| Buffalo Ridge | buffaloridge@telkomsa.net |
| | manager@buffaloridgesafari.com |
| Bush House | camp@bushhouse.co.za |
| Etali Safari Lodge | reception@etalisafari.co.za |
| Hillside Lodge | admin@hillside-lodge.co.za |
| Impodimo Game Lodge | admin@impodimo.com |
| | ops@impodimo.com |
| Jaci's Safari Lodge | jslmanager@jacislodges.co.za |
| Jaci's Tree Lodge | jtlmanager@jacislodges.co.za |
| | gm@jacislodges.co.za |
| Jamala Madikwe | info@jamalamadikwe.com |
| Kukama Lodge | kukamalodge@mweb.co.za |
| Leopard Rock | leopardrocklodge@gmail.com |
| Madikwe Hills | hannes@madikwehills.com |
| Madikwe Mooifontein | ljksnr@lkruger.com |
| Madikwe River Lodge | reception@madikweriverlodge.com |
| | gm@madikweriverlodge.com |
| Madikwe Safari Lodge | res@madikwesafarilodge.co.za |
| Makanyane Safari Lodge | makanyanegm@sanctuaryretreats.com |
| Maroela Lodge | maroelalodge10@gmail.com |
| Mateya Safari Lodge | info@mateyasafari.com |
| Matla Game Lodge | matlagamelodge@gmail.com |
| Molori Safari | lodge@molorisafari.com |

| | |
|---|---|
| Morukuru | lodge@morukuru.com |
| Mosetlha Bush Camp | info@thebushcamp.com |
| Motswiri Private Safari | lodge@motswiri.com |
| Ngau Lodge | ngau@vodamail.co.za |
| Nkurru Game Lodge | nkurrulodge@mweb.co.za |
| Rhulani Safari Lodge | reservations@rhulani.com |
| Rock Fig Lodge | info@madikwe-rockfig.co.za |
| Royal Madikwe | info@royalmadikwe.com |
| | lodge@royalmadikwe.com |
| Tamboti Lodge | tamboti@sadomain.net |
| Tau Game Lodge | gm@taugamelodge.co.za |
| | ops@taugamelodge.co.za |
| Thakadu | gmthakadu@ahahotels.co.za |
| Tree Frog Lodge | treefog@mooinet.co.za |
| Tuningi Lodge | tuningilodge@mweb.co.za |
| Ukuthula Lodge | ukuthula@telkomsa.net |

**Data collection decisions**

MGR's notoriously bad telecommunication network reception created communication challenges. Therefore, the decision was made to allow participants the option to conduct their interviews either in person or over zoom. Potential participants were invited to participate in the study via email (where emails were provided) and WhatsApp (where cell phone number were provided). However, notable data collection challenges were experienced which impacted the sample size of my study:

- The impact of the pandemic restrictions put in place forced the reserve and North West Parks Board to shut down for a few months. This created significant delays in acquiring research permits and placed major time constraints for data collection.
- In-person interviews were unfavourable to some of the potential participants due to COVID-19 health concerns (despite being presented with a detailed

COVID-19 protocol outline) and the bad reception in MGR made online interviews near impossible.

- Some potential participants did not wish to participate out of fear of deductive disclosure (despite being presented with a detailed ethical consideration outline to try prevent this). Fear of deductive disclosure was anticipated as a major challenge in the study and is the reason why specific demographic detail of respondents were specifically removed from the research document.
- Other potential participants did not respond to the interview invitation.

The resulting sample size of this study is considered to be relatively small compared to the actual OSCM population: due to the knowledge that there are 31 lodges with a full staff complement to ensure functioning lodge facilities located within the reserve as well as a NWPB office site. Thus, the MGR on-site 'population', although unquantified for the purposes of this research, is presumed to hold multiple owners, managers and other staff as well as the multiple people employed in NWPB. In contrast the sample size of respondent interviewed (coincidently, also n=31) is much smaller. The sample size for interviews included all participants who were willing to participate and was not capped.

**Data analysis decisions**

The relatively small sample size posed deductive disclosure implications. The concerns surrounding deductive disclosure despite being given assurances of the ethical considerations put into place for this study is why the specific demographic details of respondents could not be given in the research document. Therefore, although participants were asked questions relating to their positions and time spent in the MGR system (Appendix 1), this information was not used in the study for ethical reasons. For example, in some cases where only one individual occupies a position, giving any of these details will undoubtedly identify them. Thus, no details of this nature were linked to participant reporting in this study.

A mixed-methods approach was used to analyse the raw data of the transcribed interviews. This study mostly used qualitative analysis (through thematic analysis) of the qualitative data (through interview transcripts) and a limited quantitative analysis (frequency counts of emerging themes from the thematic analysis process) to support

the qualitative findings. The thematic analysis method was chosen for this study as it is widely used as a flexible foundational method for conducting qualitative analysis (Nowell et al 2017). This method is useful in examining similarities, differences and unexpected insights of participant perceptions (Braun and Clarke, 2006) which is necessary to meet the research questions of this study.

The thematic analysis process followed the six-phase thematic analysis method as proposed by Braun and Clarke (2006). Following the recommendations of Nowell et al. (2017), this method was conducted as a reflective process that moved between phases depending on how findings emerged through the data analysis process over time.

**Phase 1: Familiarizing myself with the data**

I familiarised myself with the data through transcribing the interviews and reading through them three times. During this phase, I made notes relating to interesting points raised (e.g. how the relationship between elephants and sickle bush is perceived) and potential patterns shown throughout the data (e.g. many interviews citing elephant overpopulation as a main area of management concern). These notes were used to assist in generating initial codes for phase 2.

**Phase 2: Generating initial codes**

Transcripts were uploaded onto the RQDA programme in RStudio. RStudio was chosen because it is free, open-source, and a user-friendly capabilities to assist in working efficiently with large amounts of text (King 2004; RStudio Team 2016).

To achieve the aim of the study, data were analysed and in accordance with two timeframes:

- What issues surrounded MGR's system currently
- What perceptions surrounded MGR's system facing climate change in the future.

Quotes were initially coded based on the notes created during phase one and were coded in accordance with the different objectives of the study in mind. For example: where participants indicated that their major concern was about the ecologist position being left vacant, the quote would be coded: "objective1" (to indicate that it fell under

answering the research question of *What do OSCMs currently perceive to be areas of management concern in MGR*); “Ecologist” (indicating what role was the issue); “vacantposition” (to indicate the issue at hand).

**Phase 3: Searching for themes**

Codes were then grouped to represent themes in line with answering objectives. For example, issues coded as “vacantposition” and “notqualified” were grouped under the overarching theme of “inadequately filled positions” to answer contribute to answering objective 1.

**Phase 4: Reviewing themes & Phase 5: Defining and naming themes**

In accordance with the recommendation of Nowell et al. (2017), phases four and five were conducted as a reflective process and I analysed between phases depending on how the findings emerged. I decided that themes that were too diverse, did not have enough evidence to support them, or did not align with research questions were recoded or combined according to broader categories (King, 2004; Nowell et al., 2017). Emergent themes such as ‘Strategic Agency’ and ‘Institutional Entrepreneurship’ were identified through the refinement of themes and therefore required recoding. During this phase, it was found that some concepts needed to be recoded to create a more coherent link between themes. it was apparent that participants were concerned with four main overarching themes:

1. Management and its structure.
2. Issues surrounding social development.
3. Safeguarding the ecotourism product.
4. Ecological sustainability.

Themes in this sense generally related to full quotes and not necessarily the count of single words/phrases. It is noted that the frequencies depicted in the results relate to the number of times a particular topic was brought up by all participants. For example: If 23 participants mentioned that the topic of elephant overpopulation was an issue ‘elephant overpopulation’ was counted 23 times. Therefore, if ‘elephant overpopulation’ was mentioned 41 times by one participant, the topic would still only be counted as one. It is emphasised that although a topic may have a high frequency

count, it is still noted as a perception amongst those who participated in the study (n=31), and not necessarily a reflection of the entire on-site community nor alludes to the level of importance of the topic.

Main overarching themes 1 and 2 above emerged as overarching issues filled with ‘undertone’ themes. ‘Undertones’ are concepts that were alluded to but not elaborated on or made directly apparent during interviews (Irvine et al., 2013; Mullings, 1999) ‘Undertone’ themes in this sense relate to issues such as ‘corruption’. For example: ‘Corruption’ may have only been explicitly mentioned as a topic by one individual and coded as such. However, it was alluded to in relation to other themes regarding perceptions surrounding ‘resource distribution’ and ‘inadequately filled positions’ in management. Therefore, it is emphasised again that a topic’s frequency count is noted as a perception amongst those who participated in the study (n=31), and not necessarily a reflection of the entire on-site community nor alludes to the level of importance of the topic.

Phases 4 and 5 were also conducted as a combined and reflective process because the data collection and analysis were conducted by a single researcher. Therefore, regular consultations with my supervisors were required to further refine some themes.

Once themes (overarching, undertones, etc.) were finalised, they were quantitatively analysed through frequency counts in accordance with the objectives.

**Phase 6:**

Phase six of the study involved the final write up of the dissertation which involved frequent check ins with my supervisors to monitor my progress.