A thesis submitted to the Department of Environmental Sciences and Policy of
Central European University in part fulfilment of the
Degree of Master of Science

Testing the applicability of implementing the Modified Threat Reduction Assessment tool within Private Protected Areas of South Africa

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June 12, 2020

Budapest

Erasmus Mundus Masters Course in Environmental Sciences, Policy and Management

MESPOM

This thesis is submitted in fulfilment of the Master of Science degree awarded as a result of successful completion of the Erasmus Mundus Masters course in Environmental Sciences, Policy and Management (MESPOM) jointly operated by the University of the Aegean (Greece), Central European University (Hungary), Lund University (Sweden) and the University of Manchester (United Kingdom).

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ABSTRACT OF THESIS submitted by:
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for the degree of Master of Science and entitled: Testing the applicability of implementing the Modified Threat Reduction Assessment tool within Private Protected Areas of South Africa
Month and Year of submission: June, 2020.

Global biodiversity conservation targets cannot be achieved by solely relying on state-owned PAs. In South Africa, where 79% of the country is privately owned, private PAs have become an important vehicle to increase both the total PA network and the representation of threatened ecosystems. However, despite their increasing extent and recognition, little is known about their management effectiveness. While South Africa has evaluated most of its state-owned PAs using an adapted version of the Management Effectiveness Tracking Tool (METT), to date, only a handful of private PAs have been evaluated with the same tool. Since private PAs are diverse in terms of biodiversity features, management approaches and objectives, using a standardised tool that has been adapted for state-owned PAs is not considered appropriate. Therefore, the aim of this thesis was to determine whether the Modified Threat Reduction Assessment (MTRA) is a more appropriate tool for private PAs. To determine this, first the public trust doctrine which is embedded in South Africa's environmental law was investigated, questionnaires were then used to gauge the opinions of the stakeholders involved with the implementation of METT and to determine the accompanying challenges. Lastly after comparing the TRA Index with that of the METT scores from the same private PA it was determined that the MTRA can be considered a better alternative. Institutional challenges and capacity problems prevents the METT from being implemented according to best practice guidelines. The MTRA was found to provide more benefits and less administrative challenges for private PA management.

Keywords: private protected areas, protected area management effectiveness, modified threat reduction assessment, management effectiveness evaluation tool, South Africa, public trust doctrine

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Acknowledgements

I would like to start off by whole heartedly thanking my supervisor, Dr Brandon Anthony, without whom none of this would have been possible. God works in wonderful ways and I will be forever grateful that our paths crossed in South Africa. Thank you for your guidance, encouragement, and infinite patience.

To my co-supervisor, Dr Andy Blackmore - thank you for jumping onboard last minute and opening a whole new world of environmental law to me. Thank you for guiding me towards a worthy chapter in this thesis.

I would also like to express my gratitude to all those who participated in my study and for being so generous with your time. This thesis would not have been possible without your willingness to respond to emails.

Finally, I would like to extend my thanks to my unbelievable support group - my family and friends, new and old. Thank you for your continuous encouragement and faith in my abilities. It has been a wild ride, but we made it.

Although this is a bittersweet ending to the most wonderful adventure in Europe, I will treasure my MESPOM memories forever.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

APO	Annual Plan of Operation
CBD	Convention of Biological Diversity
COP	Convention of the Parties
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
GD-PAME	Global Database for Protected Area Management Effectiveness
GEF	Global Environment Facility
IUCN	International Union for Conservation Nature
IUCN-CMP	International Union for Conservation Nature – Conservation Measures Partnership
KZN	KwaZulu Natal
MEE	Management Effectiveness Evaluation
METT	Management Effectiveness Tracking Tool
MTRA	Modified Threat Reduction Assessment
NBA	National Biodiversity Assessment
NBF	National Biodiversity Framework
NBSAP	National Biodiversity Strategy and Action Plan
NDP	National Development Plan
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NEMPA	National Environmental Management Protected Areas Act
NGO	Non-Governmental Organisation
NPAES	National Protected Area Expansion Strategy
N&S	Norms and Standards
PA	Protected Area
PAME	Protected Area Management Effectiveness
PoWPA	Programme of Work on Protected Areas
PTD	Public Trust Doctrine
RAPPAM	Rapid Assessments and Prioritisation of Protected Area Management
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SES	Socio-ecological System
TRA	Threat Reduction Assessment
UNDP	United National Development Programme
WDPA	World Database on Protected Areas
WPCA	World Commission on Protected Areas

1. Introduction

Protected areas (PA) are widely recognised as the cornerstone of global *in situ* conservation strategies (Watson *et al*. 2014). Consequently, in response to massive global biodiversity loss, establishing PAs has become the main strategy used to prevent further loss of biodiversity and ecological services (Ayivor *et al*. 2019; Barnes *et al*. 2017b; Chape *et al*. 2005; Coad *et al*. 2015; Gaston *et al*. 2006; Geldmann *et al*. 2013; Leverington *et al*. 2010; Mora and Sale 2011; Stolton *et al*. 2019). Currently, 245 133 registered PAs now cover 15.2% of the global terrestrial surface (Diaz *et al*. 2019; UNEP-WCMC *et al.* 2020), a 58% increase since 1990 (Morales-Hidalgo *et al*. 2015)

The principal objective of PAs is to conserve biodiversity by eliminating or minimising human pressures and threats operating within its boundaries (Schulze *et al.* 2018). In doing so, populations should essentially be maintained (Mora *et al*. 2011; Saura *et al*. 2018). It is universally recognised that without PAs, global biodiversity loss would be even greater (UNEP-WCMC *et al.* 2018).

Despite the extensive increase in global PA coverage, biodiversity is still being lost, including within some PAs (Barnes *et al*. 2017b; Chauvenet *et al*. 2017; Eklund *et al*. 2019; Geldmann *et al*. 2015; Schulze *et al*. 2018). Numerous studies have reported habit loss, population declines, poaching and encroachment within the borders of PAs (Ayivor *et al*. 2019; Coad *et al*. 2015; Mora and Sale 2011; Timko and Innes 2009; Tranquilli *et al*. 2014; Watson *et al*. 2014). The failure of PAs in meeting conservation objectives indicates the general misconceptions regarding the mechanisms required for PAs to be effective in mitigating threats (Eklund 2016; Ferraro and Pressey 2015; Geldmann *et al*. 2013). This failure has highlighted the historic misplaced reliance on PAs automatically guaranteeing biodiversity protection (Tranquilli *et al*. 2014), in addition to the general lack of quantitative data to help understand how and under what

conditions different PA management interventions improve PA effectiveness (Geldmann *et al*. 2013; Le Saout *et al*. 2013). Studies have also emphasised that the current global PA network fails to ensure ecological representation, an important requirement to maintain ecological services and ensure climate change resilience (Diaz *et al*. 2019). While 44% of global ecoregions are reportedly protected, 5.6% of ecoregions still have less than 1% protection or none at all (UNEP-WCMC *et al.* 2020). As a result, the Convention of Biological Diversity (CBD) has recognised that target setting alone is not sufficient for biodiversity conservation purposes. Since the inception of PA expansion targets in 1992, countries have declared new PAs without increasing their commitment to provide the necessary support required to ensure sound management (Barnes *et al*. 2017b). The location of these PAs has also been biased towards areas of high elevation and low productivity, usually not biologically diverse. As a result, many of the world's PAs exist only as "paper parks", lacking effective management capacity and unlikely to deliver effective conservation (Geldmann *et al*. 2013). Paper parks are detrimental to biodiversity conservation targets as they create a false sense of success (Rife *et al*. 2013).

To remedy this, the importance of management effectiveness and key-area protection has been recognised and emphasised within the CBD's Strategic Plan for Biodiversity 2011-2020 (CBD COP 10 Decision X/2) Target 11 adopted in 2010. It states that: "*By 2020, at least 17% of terrestrial and inland water areas, and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes."* (CBD 2010a; emphasis added). This target is over and above any domestic requirements, a country may have.

Management Effectiveness Evaluation (MEE) is defined as the assessment of how well PAs are managed in terms of the extent to which goals and objectives are achieved, such as avoiding direct biodiversity loss or mitigating biodiversity threats (Eklund *et al*. 2019; Mark Hockings *et al*. 2006). Furthermore, MEE attempts to understand the relationship between management actions and ecosystem conditions (Barnes *et al*. 2017; Cook and Hockings 2011). Today, more than 70 Protected Area Management Evaluation (PAME) tools have been developed and introduced globally as a method of ensuring PAs are *effectively* managed (UNEP-WCMC *et al.* 2020).

While countries have been called upon to increase ecological representation within their PA networks, it is rarely possible with sole reliance on state-owned PAs. As such, private PAs have globally become an important vehicle to not only increase the total PA estate and representation of threatened ecosystems but also increase its connectivity (SANBI 2018). However, similar to state-owned PAs, the effectiveness of their contribution remains poorly understood (Shumba 2019). This is despite concerns of their size variation, location, and profit-driven management on long-term effectiveness at biodiversity conservation (Shumba 2019). In the case of South Africa, where 79% of the country is privately owned and inadequate funding severely limits land acquisition (De Vos and Cumming 2019) alternative strategies including private PAs have also been explored (SANBI 2018).

There is thus an urgent need to determine the management effectiveness of private PAs in protecting biodiversity. While various PAME tools have been introduced into state-owned PAs, few have evaluated their suitability within a private PA setting.

In South Africa, the Management Effectiveness Tracking Tool (METT) has been introduced within most of its state-owned PAs since 2010, with subsequent targets set to evaluate all state-owned

PAs and achieve acceptable management effectiveness scores within the next few years (DEA 2018). However, to date, no broad-scale plan has been introduced to ensure private PAs undergo similar evaluations. This is despite studies showing private PAs to be the largest contributor for protection of threatened and under-protected habitat-types, in addition to constituting over 25% of South Africa's total PA estate (De Vos and Cumming 2019). Furthermore, because private PAs are diverse in terms of biodiversity features, management approaches and motivations, using a standardised tool that has been adapted for state-owned PAs is of concern (Le Saout *et al*. 2013; De Vos and Cumming 2019), particularly if the benefits of the tool are not recognised and its implementation considered too onerous by private management and therefore not used according to "best practice" guidelines. As such, applying a simpler MEE tool may be considered more appropriate without compromising the aim of an evaluation, especially for private PAs who may not have the same resources as state-owned PAs.

The Modified Threat Reduction Assessment (MTRA) uses threat mitigation as a proxy for management success (Anthony 2008). Since this constitutes one element of management effectiveness and ties back into the objectives of a PA, the MTRA tool is considered a feasible alternative for evaluating the effectiveness of private PAs.

1.1. Aim and Objectives

The aim of this study is to answer the following question:

To what degree can the MTRA tool be used to evaluate management effectiveness within private PAs in South Africa?

This overarching question is answered by way of the following array of subordinate questions:

1. Why has PAME generally, and METT specifically, been introduced into South Africa's PAs if the public trust doctrine is explicitly embedded in its environmental laws?

2. Do stakeholders involved in PPA management and biodiversity stewardship consider METT to be the most feasible tool to use and what challenges exist regarding its use?
3. How does the MTRA tool compare with METT when applied to the same site? Can it act as a complementary or standalone tool?

1.2. Research contribution

This research will contribute to the PAME field by validating the application and use of MEEs within private PAs, focusing specifically on the METT and MTRA tool. In the absence of literature denoting to the contrary, this study appears to be the first within South Africa.

1.3. Thesis Organization

This thesis is organised into five chapters. Chapter one provides an overview of the research topic and the research gap to be filled. Chapter two expands on the study site and provides context. Chapter three focuses on the research approach and its subsequent analysis. The results are discussed and interpreted in Chapter four. Chapter five concludes the thesis, linking it back to the aim and objectives while also providing recommendations for future research.

2. Background information

Important concepts introduced earlier will now be expanded on, starting with the role of PAs and how they have evolved, including the socio-ecological factors that shape their long-term effectiveness. This is followed by investigating the emergence and role of private PAs, including the evolution of the different methods available to quantify PA effectiveness. These elements are then discussed within the context of the study site, South Africa, first theorising on the role of the public trust doctrine and how MEE is embedded within it. The chapter concludes with an investigation of current PAME evaluations within South Africa.

2.1. Biodiversity Conservation

Biodiversity is the cornerstone of our survival; our health, food, and security are intrinsically linked to it (DEA 2016). It is estimated that ecosystem services, which form the building blocks of modern society, is estimated to be worth more than US$125 trillion annually (WWF 2018). However, our overconsumption and exploitation of resources have resulted in unprecedented planetary change, with more than 75% of the terrestrial surface now impacted on by humans (Geldmann *et al*. 2013). We are now living in what is commonly known as the Anthropocene, in which biodiversity is disappearing at an alarming rate (WWF 2018).

Habitat loss and fragmentation is presently the single largest driver of biodiversity loss as a result of human land-use activities and projected to remain the dominant threat to terrestrial biodiversity despite the onset of climate change (Eklund 2016; Mittermeier *et al*. 2011; Tilman *et al*. 2017). Biodiversity loss is further accelerated with increasing impacts from human overconsumption, alien invasive species, natural systems modification (changes in hydrological regime, pollution and waste, and fire regime change), and climate change (Skowno *et al*. 2019). These threats have resulted in the current rate of species extinction to surpass those of all five

global mass-extinction events caused by natural cataclysmic forces of the past 500 million years (Tilman *et al*. 2017). An additional concern is that of negative feedback mechanisms that are anticipated to contribute to increased deterioration of ecosystem services in the years to come (Eklund 2016).

The extensive loss of biodiversity causes severe degradation of ecological services, which in turn holds substantial social and economic consequences (Mittermeier *et al*. 2011; Tucker 2005). Similarly, the loss of genetic diversity, often an overlooked consequence, will affect the ability of ecological communities to resist or recover from disturbances and environmental changes, including long-term climate change (Doran and Richardson 2003)

Our general lack of knowledge and understanding of complex, dynamic ecological systems and processes, poses an additional threat as it undermines our attempts to find long-lasting solutions (Doran and Richardson 2003). Where knowledge is available, problems are exacerbated by a lack of awareness among the general population, including a lack of resources, funding and political will to address solutions for the surmounting threats (Doran and Richardson 2003).

Although dramatic human impacts go back for millennia (Geldmann 2013), the threat of continued and accelerated loss of biodiversity to human well-being resulted in the establishment of multiple international agreements, the most impactful being the CDB in 1992. The Convention set into motion actions that have now placed biodiversity concerns at the concern of global, regional, and national efforts for sustainable development and poverty eradication.

The CBD focuses on three main objectives: (1) the conservation of biological diversity; (2) the sustainable use of the components of biological diversity; and (3) the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources (CBD 2004b). Today the CBD is ratified by 196 countries who have legally committed to maintaining the world's ecological

infrastructure alongside economic development. All targets and frameworks adopted by the CBD have to be integrated into the Parties' national environmental policies (CBD 2004b).

The CBD is the most important international legal instrument addressing PAs and their expansion. Article 8 of the Convention calls for the establishment of PAs or areas where measures are in place to conserve biological diversity (CBD 2020). The development of Aichi Target 11 was guided by two previous targets which were not sufficiently met - the first-ever target set to increase global PA coverage was adopted in g at the IVth World Parks Congress with the goal to extend the PA network to cover at least 10% of each major biome by 2000 (IUCN, 1994). When the target was not met, it was again elaborated in the recommendations of the Vth World Parks Congress in 2003, Target 1.1 which called for: "*at least 10 percent of each of the world's ecological region* [to be] *effectively conserved"* (COP Decision VII/30) (Goriup 2008).

2.2. Overview of Protected Areas

Since the 1960s, the principles of establishing and managing PAs have grown significantly, largely due to the work done in the 1950s by the International Union for Conservation Nature (IUCN) and the now World Commission on Protected Areas (WPCA) (Chape *et al*. 2005). Although more than 1000 different terms exist for defining a PA, the most widely accepted definition is that of the IUCN: "A protected area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values." (Dudley 2008, 8).

2.2.1. The History of PA Establishment

PAs were originally not established for the purpose of biodiversity conservation, but rather for different cultural, recreational, or religious reasons, including maintaining hunting lands for

royalty and the landed gentry (Doran and Richardson 2003). When they were established for conservation purposes, the focus was on protecting larger, more charismatic species than those composing the bulk of biodiversity (Doran and Richardson 2003). Moreover, sometimes the establishment of these areas involved the forcible removal of local people, denying them access to the resources they were once dependent on (Anthony 2007; Shumba 2019). However, over the past 40 years, a paradigm shift in the role of PAs has occurred to that of a broader conceptual and practical approach (Chape *et al*. 2005).

Up until the 1990s, excluding humans, preventing consumptive use, and the minimisation of other forms of human impact from conservation areas in order to maintain pristine or wilderness areas dominated the PA establishment model (Hutton *et al*. 2005). With increased recognition that the costs of biodiversity conservation were not distributed in proportion to their benefits, specifically in terms of poverty alleviation efforts, integrated community-based conservation challenged the narrative of fortress conservation (Adams *et al*. 2004; Hutton *et al*. 2005). The link between poverty and conservation stems from the historical practice of establishing PAs in areas with poor agricultural potential, often surrounded by poor communities (Shumba 2019). Exclusionary conservation is simply not sustainable or justifiably ethical, as culture, traditions, and nature are a continuum that cannot be separated (Kothari 2008). There is also increased recognition that when societal interests and livelihoods are threatened by a conservation model, its chances of success are rare (Shumba 2019). Consequently, rethinking the role of PAs to accommodate different objectives such as sustainable human use and the importance of cultural and social values has led to different PA management categories being recognised (Dudley *et al*. 2010).

The different PA management categories range from strict nature reserves which ban or limit human visitation, to protected landscapes where permanent human communities follow management practices to allow for nature conservation objectives. The size of PAs can vary between less than 1ha to millions of hectares, either run by the government, private individuals, or local communities (Dudley *et al*. 2010). The categories were primarily designed as a framework for reporting data to the World Database on Protected Areas (WDPA), but it is increasingly being used as an instrument for policy, planning, and legislation (Dudley *et al*. 2010).

The six categories comprise the following (Dudley *et al*. 2010):

Table 1 - IUCN PA Categories

Category Ia (strict nature reserve)	Set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use, and impacts are strictly controlled and limited to ensure the protection of the conservation values.
Category Ib (wilderness area)	Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition.
Category II (national park)	Protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational, and visitor opportunities.
Category III (natural monument or feature)	Protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological features such as a cave, or even a living feature, such as an ancient grove.
Category IV (habitat/species management area)	Protect particular species or habitats, where management reflects this priority. Many will need regular active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.
Category V	Where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological,

(protected landscape)	cultural and scenic value and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated values
Category VI (PAs with sustainable use of natural resources)	Conserve ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen.

In addition to the increased recognition of the socio-ecological role of PAs, so too has the role of private PAs for biodiversity conversation been recognised (Skowno *et al*. 2019; SANBI 2018). While private PAs have been inexistence since the 18th century (Shumba 2019), they were officially only recognised in 1962, when delegates at the World Congress on National Parks acknowledged that a number of nature reserves were privately owned. By the 1990s, several countries had established supporting laws and policies, when in 2003 at the Vth World Parks Congress, private PAs were officially endorsed with the approval of the Private Protected Area Action Plan (IUCN 2004). This plan provided a detailed framework for improving and expanding private PAs, including the first broadly supported definition: "A land parcel of any size that is (1) predominantly managed for biodiversity conservation; (2) protected with or without formal government agency recognition; and (3) owned or otherwise secured by individuals, communities, corporations, or nongovernmental organisations" (IUCN 2004, 275). Following this recognition, the most significant mandate for private PAs was introduced with the approval of the CBD's Programme of Work on Protected Areas (PoWPA) (Langholz 2010). Since then, several action plans for incorporating private PAs into national PA systems, including best practice guidelines have been produced.

The extent and number of private PAs continue to grow, particularly in Europe, Australia, Latin America, Canada and southern Africa (Langholz 2010; Shumba 2019), largely as a result of the global ecotourism boom, societal interest in biodiversity conservation and alternative methods required for PA expansion and the protection of underrepresented ecosystem types (Langholz 2010; Shumba 2019; Skowno *et al.* 2019; SANBI 2018). According to the IUCN WDPA, that there are approximately 14 296 private PAs spread across 25 countries worldwide. However, this number is assumed higher due to the low levels of reporting of private PAs on the WDPA (Wright *et al.* 2018).

Globally, the progress in PA expansion is undeniable, however, it has been proven insufficient. Studies have shown a 60% decline in species population sizes in the last 45 years, while at least one million species are at risk of extinction (Ayivor *et al*. 2019; Geldmann *et al*. 2019; Diaz *et al*. 2019; Mora and Sale 2011; Tucker 2005). Using the human footprint to quantify the extent and intensity of human pressure with PAs, Jones *et al.* (2018) found only 42% of protected land to be free from any measure of human pressure. Roughly a third of protected land was under intense pressure, while most than fifty percent contained land solely under human pressure. Ultimately, for the majority of countries, more than half of their PAs are currently under intense human pressure and as such, 74 of the 111 countries that have reached Aichi Target 11 PA coverage, should not qualify as meeting the target. These findings emphasise the failure of current conservation measures in addressing known add on biodiversity, despite previous targets pertaining to it (CBD 2010b). This has been attributed to countries failing to sufficiently integrate biodiversity issues into broader policies and strategies, allowing the drivers of biodiversity loss to continue unabated. Overall, the link between human well-being and biodiversity conservation is not reflected in broader policies (CBD 2010b).

2.3. Protected Areas as a Socio-Ecological System

PAs are embedded in complex social and ecological systems (Barnes *et al*. 2017b). Their ability to protect biodiversity within their boundaries is affected by a range of both direct and indirect pressures within and outside their boundaries, including social, governance, policy, and management systems in which they operate. The expectations placed on PAs has increased exponentially, with many now created not only to conserve biodiversity and provide habitat for endangered wildlife, but also to improve social welfare by contribute to the livelihoods of local communities and providing economic benefits across multiple scales (Naughton-Treves *et al*. 2005; Watson *et al*. 2014). Biodiversity conservation aims to understand and manage these interactions to achieve acceptable ethical, equitable, and political solutions for diverse stakeholders (Cumming and Allen 2017). As such, it is recognised that PAs cannot be managed as ecological islands, but rather as socio-ecological systems (SES) with multiple interacting components (Shumba 2019). These SESs produce a set of ecosystem services essential for human well-being, including but not limited to clean water and air, food, pollination, climate regulation, protection from climate fluctuations, recreation, and other cultural services, while also contributing to local and national economies through hunting and tourism (Biggs *et al*. 2017; Shumba 2019). Due to our interdependence and the subsequent impact on these SESs, enhancing the resilience of these ecosystem services has increasingly been recognised (Shumba 2019). People depend on ecosystems in a variety of ways, and this dependence often requires modifying or managing ecosystems to enhance particular ecological goods and services (Cumming and Allen 2017). Consequently, land use and management choices are associated with trade-offs for other services (Cumming and Allen 2017). At a national scale, this modification or "impact" is largely driven by income, human population density, and development activities (Tilman *et al.* 2015). This is particularly relevant within developing countries that host one or more biodiversity hotspots.

Collectively these areas harbour more than half of all plant species, 43% of all terrestrial vertebrates as endemics, and an even greater proportion of threatened species (Mittermeier *et al*. 2011). Consequently, it is estimated that biodiversity in developing countries will experience large scale pressures and increased extinction threats in the next few decades (Mittermeier *et al.* 2011). While conservation efforts in these areas are complex, without securing their protection, it is estimated that nearly half of all terrestrial species will be lost, regardless of success elsewhere.

Management choices and its subsequent environmental consequence are infinite, but its consideration is necessary to determine PA effectiveness. Within a private PA setting, trade-offs are shaped by a profit-orientated management system (Shumba 2019). Because private PAs need to generate their own income, these areas are often over-developed, intensively managed, and overstocked with particular species for the tourism and hunting market (Langholz 2010; Shumba 2019). This decision comes at the expense of the vegetation and diversity of other vertebrate species.

With ecotourism being regarded as the world's fastest-growing industry, and it is shown to generate revenue equivalent to that of farming, forestry, and fisheries combined in southern Africa, systems are required to ensure private PAs remain effective for long-term biodiversity conservation purposes (Shumba 2019).

2.4. Quantifying the effectiveness of PAs

The persistence of biodiversity within a PA is largely dependent on the degree at which conservation efforts are successful at maintaining natural processes by mitigating threats and anthropogenic pressures (Tranquilli *et al*. 2014). Globally pressures on PAs are continuously increasing alongside an increasing human population, emphasising the importance of prioritising

threat mitigation as PAs become a final refuge for many threatened species and ecosystem processes (Watson *et al.* 2014)

Depending on a PA's objective, the term *effectiveness* is used to describe the success of these conservation efforts (Eklund and Cabeza 2017; Geldmann 2013). PA objectives can range from (1) improving the state of nature; (2) decrease pressures and threats; (3) improve inputs and management and (4) improve benefits and ecosystem services (Geldmann 2013). While it is optimal for a PA to be effective in all four, trade-offs are eminent, and it should be recognised that optimising one could reduce the effectiveness of another.

The apparent mismatch between conservation efforts and biodiversity outcomes has emphasised the global need to evaluate the effectiveness of PA in mitigating threats and preventing the loss of biodiversity (Cook and Hockings 2011; Eklund 2016). With studies reporting a lack in empirical data on the impact of PAs and site-level drivers of ecological outcomes, increased focus is being placed on determining what factors other than size, number and physical characteristics influence the success of a PA in meeting its conservation objectives (Barnes *et al*. 2017; Cook *et al*. 2014) (Barnes *et al.* 2017; Cook *et al.* 2014; Leverington *et al.* 2010). While effectiveness is a challenging entity to measure, these studies are imperative as widespread PA failure will not only undermine global conservation strategies but also erode public and political support for conservation strategies (Barnes *et al.* 2017; Mora and Sale 2011). Accountability and transparency have become progressively more important in a time of increased habitat conversion and limited resource availability (Leverington *et al.* 2010; Mora and Sale 2011). There is a growing need to weigh conservation strategies against human development goals, particularly in developing countries where PAs establishments have been known to generate conflict among local residents (Mora and Sale 2011). If a PA were to prove successful, political leaders and communities would

be more accepting of future PA proclamations. Funding agencies also require effectiveness evaluations to determine who would benefit the most from financial support and whether previous investments have been successful (Leverington *et al.* 2010). These global studies will also allow for knowledge sharing and increased collaboration between management and research entities.

Monitoring is a crucial component of any evaluation in order to detect a change and track progress towards management objectives (Tucker 2005). Change is detected with the systematic collection and analysis of repeated observations or measurements (Anthony 2014). Two types of indicators are generally used for this purpose – biological and management – with ongoing debates regarding the most appropriate for monitoring conservation efforts (Margoluis and Salafsky 2001).

Historically, PA effectiveness was measured using biological indicators as a proxy, which involved any metric corresponding to a tangible change in biodiversity abundance, condition, or function (Barnes *et al.* 2017; Eklund and Cabeza 2017; Eklund *et al.* 2019; Geldmann *et al.* 2013). Under the assumption that PAs provided effective protection one established, most of these studies focused on either using habitat cover (i.e. rate or extent of forest loss) or animal population trends to measure *ecological effectiveness* (Eklund and Cabeza 2017). While the use of biological indicators is beneficial and provide information at a finer scale that aid in the prioritisation of specific conservation actions, practically the challenges in their implementation and analyses outweigh the intended benefits. They are often associated with high costs and implementation restrictions due to the need for baseline data, trained personnel, and special equipment (Anthony 2008; Margoluis and Salafsky 2001; Stolton *et al.* 2019). Moreover, biological parameters are often too insensitive for short-term projects due to significant lag times between interventions and subsequent biological outcomes (Margoluis and Salafsky 2001). Natural biodiversity fluctuations also hold the potential of further skewing results and misrepresenting the impacts of management

interventions (Margoluis and Salafsky 2001). Furthermore, with studies finding large variations in the performance of individual PAs, contextual factors such as governance quality and management have been hypothesised as key factors for PA effectiveness (Eklund *et al.* 2019), as such, the need for other approaches to assess PA performance has been sought out and developed (Stolton *et al.* 2019).

Management effectiveness evaluations are one such approach that has recently been recognised as a critical step to ensure PA success (Eklund 2016; Geldmann *et al.* 2013). MEE is defined as the assessment of how well PAs are managed in terms of the extent to which goals and objectives are achieved, such as avoiding direct biodiversity loss or mitigating biodiversity threats (Eklund *et al.* 2019; Hockings *et al.* 2006).). Most importantly, MEE attempts to understand the relationship between management actions and ecosystem conditions (Barnes *et al.* 2017; Cook and Hockings 2011).

Unlike biological indicators, management indicators have been proven to be more cost-effective and easier to apply (Anthony 2014). This is particularly beneficial in developing countries with limited funding. With the recognition that PA success is not only as a product of its number, size, integrity, and spatial connectedness but also a product of its management., PAME has received considerable attention in the last three decades (Brandon 2014). The main premise of PAME is based on the assumption of a strong relationship between management and conservation outcomes (Schleicher *et al.* 2019). Because monitoring the state of biodiversity is often costly, time-consuming, and difficult, performance assessments are an appropriate substitute to not only access threats to biodiversity but also communicate the effectiveness of different conservation strategies (Anthony 2008; Stolton *et al.* 2019). It is now more widely acknowledged that achieving effective management is only attainable with a management approach that allows for current

management practices to be scrutinised and improved (Hockings *et al.* 2006). The need for adaptive management is becoming increasingly vital alongside our ever-changing natural world.

2.5. Protected Area Management Effectiveness (PAME)

The concern of "paper parks" has been a concern since the mid-1980s, only becoming of global interest in the last two decades (Ervin 2003; Hockings and Phillips 1999). It was first identified as a global concern at the IVth World Parks Congress in 1992 (Leverington *et al.* 2010) and although several methodologies for assessing management effectiveness were developed soon after, it was primarily only used in Central and South America (Hockings *et al.* 2015). While there had been several calls for a more comprehensive PA evaluation system, few PA management agencies had followed through. It was only after the release of the IUCN-WCPA's guidelines in 2000 and the CBD establishing the PoWPA that management effectiveness became a global priority (Hockings *et al.* 2006). In these guidelines, management effectiveness is defined as "the assessment of how well the PA is being managed – primarily the extent to which it is protecting values and achieving goals and objectives" (Hockings *et al.* 2006, 2). This framework has since formed the foundation for most of the PAME tools developed and applied globally (Hockings *et al.* 2015). PAME is based on the assumption that improvements in PA management would result in a positive impact on biodiversity due to studies indicating a correlation between increasing PAME scores and improvements in biodiversity outcomes (Coad *et al.* 2015). In addition to allowing for adaptive management, these evaluations will improve the effective allocation of limited resources (Stolton *et al.* 2019).

Ideally, any evaluation should (Hockings and Phillips 1999):

- promote and enable adaptive management;

- track management style changes and objectives to ensure clear communication to ensure specific management approaches are understood;
- improve planning;
- comparative analysis with other PAs to allow for collaborative learning in order to choose the best management approach;
- allow a review of the chosen approach in order to prioritise successful strategies thereby ensuring resources are used effectively; and
- help involve the community, build constituency and promote PA values

The PAME assessment encompasses three themes: (1) design and planning; (2) the success of management systems and processes; and (3) delivery of PA objectives, including conservation values (Hockings *et al.* 2006; Stolton *et al.* 2019). Within these three themes, the WCPA framework identifies six key elements of the PA management cycle which form the basis of a PAME assessment, namely context, planning, inputs, processes, outputs, and outcomes (Figure 1). The framework stresses the importance of first establishing comprehensible, measurable, and outcome-based objectives to allow for comparative analysis when using the results of a PAME tool (Hockings *et al.* 2006).

The importance of MEE for successful PA management has only fully been recognised on a global scale and enforced by several international bodies and donor agencies in the last two decades (Coad *et al.* 2015; Hockings *et al.* 2006). The first version of the framework was published in 2000 and field-tested by a handful of non-governmental organisations (NGOs) and park agencies.

In 2003 it was adopted by the environmental funding agency Global Environment Facility (GEF), and later by the CBD in 2006 (Coad *et al.* 2015; Hockings *et al.* 2015). In addition to improving PA management, these evaluations also increase accountability and transparency with stakeholders, create communication lines with the public, and/or allow for effective resource

Figure 1 - The WCPA Framework for PAME (Hockings *et al.* 2006).

prioritisation (Hockings *et al.* 2006).

Due to the diversity of PAs in terms of values, cultural settings, and management methods, the WCPA framework has been used to develop more than 95 different PAME tools (Hockings and Phillips 1999; Hockings *et al.* 2006; Ayivor *et al.* 2019). The methodologies range from relatively simple questionnaires to more sophisticated approaches that are either adapted to specific countries or applied more widely across the world (Coad *et al.* 2019).

Unlike other assessments, PAME encompasses all elements of PA – from management approaches and its affiliated outcomes to involving stakeholders and considering its social impact (Hockings *et al.* 2006). All PAME tools rely on qualitative indicators to assess management success, thereby relying heavily on the knowledge of PA managers and stakeholders operating the tools (Cook and Hockings 2011; Geldmann *et al.* 2015). Qualitative indicators are well suited to evaluating the context (threats, values, stakeholders, management and political environment), planning (vision, objectives, strategies) and management process within PAs, while quantitative indicators are best suited for inputs (resources), outputs (achievement of the identified activity or target) and outcomes (whether long-term objectives have been met) (Cook and Hockings 2011). In the absence of quantitative data, expert opinion is the best available data. Although qualitative research methods carry limitations, they can fill in the knowledge gaps biological monitoring programs cannot provide (Cook and Hockings 2011). This is essential when the link between management actions and conservation outcomes are not obvious and potentially beyond management control, as in the case of MEE reviews finding poor governance and political, legislative and institutional barriers as being one of the underlying issues (Anthony 2014; Barnes *et al.* 2017; Coad *et al.* 2015).

Despite the widespread implementation of MEEs, the data rarely appears in peer-reviewed literature as it is neither made public nor are the results summarised in the gray literature (Cook and Hockings 2011). Therefore, to encourage data sharing, accountability and future research, the CBD established the Global Database for Protected Area Management Effectiveness (GD-PAME), which contains details of individual PAME assessments, and the methodologies and indicators used (Coad *et al.* 2015). This database will allow researchers to study the consequent impact of management interventions on conservation outcomes (Barnes *et al.* 2017; Coad *et al.* 2015). While

Coad *et al.* (2015) reported only 17.5% of countries to have met the 2015 60% PAME assessment target currently, the database contains over 27 657 assessments from 70 different PAME methodologies (UNEP-WCMC 2020).

PAME assessments usually last 1-3 days and are completed by a group of PA stakeholders, ranging from managers, partners, including representatives from local governments, local communities and NGOs (Coad *et al.* 2015). The most widely used PAME assessments are the METT, the New South Wales State of Our Parks (SOP) methodology and the Rapid Assessments and Prioritisation of Protected Area Management (RAPPAM) (Coad *et al.* 2015). Recently, the MTRA has grown significantly and is now registered in the GD-PAME.

2.5.1. Management Effectiveness Tracking Tool (METT)

The METT was first developed by WWF in 2002 in collaboration with the World Bank/WWF Alliance for Forest Conservation and Sustainable Use, with the sole purpose of evaluating progress towards a single time-limited conservation target (Stolton and Dudley 2016). However, it quickly became the most used PAME tool globally which resulted in it undergoing several improvements to allow compatibility with other study sites. METT 3 is the most recent version and is accompanied by a set of guidelines released by the original authors after analysing how the tool had been applied since its initial release (Stolton *et al*. 2019).

The METT is now used to primarily track progress at a single site while identifying actions required to address any management weaknesses (Stolton and Dudley 2016). The tool is not intended to compare management between sites or reflect overall conservation results. However, the development of a large global database of METT results has encourage comparative analyses in order to identify successful management processes.

The METT focuses on five elements of PA management (DEA 2019):

1. understanding the context of existing values and threats;
2. PA planning and design;
3. resource allocation within a PA;
4. management processes implemented and
5. outputs or impacts of management actions.

It has become the most widely applied PAME tool globally largely due to four factors (i) its ease of use and adaptability; (ii) CBD parties are obligated to undertake a PAME assessment; (iii) it has been widely promoted by its developers; and (iv) the METT has been mandatory for all projects funded by the GEF since 2002 (Stolton *et al*. 2019).

It was at the Seventh Meeting of the Conference of the Parties (COP7) in 2004 where CBD parties were persuaded to include the need for assessment of management effectiveness in the CBD's PoWPA (Stolton and Dudley 2016). Because results from the first METT assessment was presented, many parties decided to adopt METT as the preferred PAME tool (Stolton and Dudley 2016).

The METT consists of a scorecard questionnaire that is usually completed as a group exercise involving protected area managers and other stakeholders. It includes the six management elements defined by the WCPA Framework, placing greater emphasis on context, planning, inputs and processes. It enables stakeholders to identify needs, obstacles and actions to be prioritised to improve PA management.

The adequacy of 30 management elements is evaluated with a scoring range of 0-3, where 0 indicates no management and three sound management. Evaluation scores are divided into categories as suggested by Leverington *et al.* (2010):

a) < 33% - clearly inadequate

b) 33-50% - Basic with significant deficiencies

c) >50-67% - Basic

d) > 67% - Sound

The greatest disadvantage of METT is its inability to compare management effectiveness across sites. Because it only provides a rapid on-site evaluation of progress, it does not allow for a detailed evaluation of outcomes (Stolton and Dudley 2016).

2.5.2. Modified Threat Reduction Assessment (MTRA)

The Threat Reduction Assessment (TRA) was first designed in 1999 as a low-cost, practical alternative which only focuses on threats (Margoluis and Salafsky 2001). This tool is particularly useful in sites where little or no baseline data exists (Anthony 2014). The underlying concept is based on using threat mitigation as a proxy of conservation success – after identifying known threats, progress in achieving conservation is measured by monitoring the degree to which the identified threats have changed over time (Anthony 2008; Milatović *et al.* 2019). Furthermore, it allows for comparison across sites and institutions in part (if common threats are used) due to the standardisation of identified threats using the IUCN Standard Lexicon of Threats classification (Matar and Anthony 2010).

This concept is based on three key assumptions (Lamsal *et al.* 2015):

1. All degrees of biodiversity degradation, unless natural causes, is as a result of humans

2. All direct threats to biodiversity at a given site can be identified and ranked

3. Changes in all threats can be measured or estimated either quantitatively or qualitatively

The tool is a more focused and detailed approach to direct threats to biodiversity than other widely used MEE tools. In 2008, the TRA was modified by Anthony (2008) to assess changes in threats

more accurately by allowing the inclusion of worsening or emerging threats, thereby being renamed the Modified Threat Reduction Assessment (MTRA).

Threats, which are dynamic impacts that result in environmental deterioration, can be subdivided into three general types: (1) internal direct threats which involve direct impacts caused by those living within the study area; (2) external direct threats arise from impacts caused outside of the study area; and (3) indirect threats which are social, political or economic factors that ultimately influences direct threats (Margoluis and Salafsky 2001).

The MTRA entails a questionnaire that is completed in a workshop format involving stakeholders most knowledgeable about the site. The tool produces one quantitative result (TRA Index) expressed as a percentage, indicating management success in mitigating the threat over a defined period of time. The MTRA has now been utilized for 11 assessments in 6 countries (UNEP-WDPA *et al.* 2020).

Albeit advantageous in terms of ease of use, it is not suited for comprehensive MEEs. Furthermore, the three assumptions are unlikely to be met for the system to provide reliable and accurate assessments of actual biodiversity impacts (Tucker 2005). Tucker (2005) also indicated that unless the biodiversity component and its ecosystem have been subject of intensive long-term studies, MTRA can only serve as a guide to likely impacts. If so, assessments should also address state and response indicators.

2.6. South Africa

With a surface area of 1.2 million km^2 which represents only 1% of the Earth's total land surface, South Africa contains almost 10% of the world's total known bird, fish and plant species, and over 6% mammal and reptile species (UNDP 2012). South Africa is ranked within the top ten most biologically diverse countries in the world (Skowno *et al.* 2019) containing three of the

world's 34 biodiversity hotspots: the Maputaland-Pondoland-Albany Hotspot, the Cape Floristic Region and the Succulent Karoo (DEA 2015; 2017). Consequently, South Africa's biodiversity is characterised by high levels of species diversity and endemism, which is categorised into nine biomes, 21 biozones, and 1021 ecosystems types, approximately 80% of which are endemic (Skowno *et al*. 2019).

South Africa's biodiversity assets and ecological infrastructure is a national asset that contributes to environmental integrity, economic development, and social well-being. The country's thriving tourism and wildlife industries are estimated to provide half a million jobs (Skowno *et al.* 2019). However, with a growing population currently estimated at 58.8 million and an unemployment rate of 29.1%, protecting South Africa's vast ecological infrastructure on which millions of its citizens are dependent on, has become imperative (UNDP 2012; StatsSA 2020).

2.7. Threats

South Africa has adopted the IUCN-CMP threat classification scheme which encompasses a hierarchical structure for various pressures on biodiversity (Skowno *et al.* 2019). This scheme is used when assessing biodiversity for the National Biodiversity Assessment (NBA) report. The most recent NBA indicates that despite South Africa having numerous innovative policies, frameworks, and the extensive effort being made in the biodiversity sector, the country's biodiversity remains under high pressure from a variety of factors (DEA 2017, Skowno *et al.* 2019). The root cause of all pressures is related to patterns of consumption and production (UNDP 2012; Skowno *et al.* 2019).

There are multiple drivers of biodiversity loss interacting within South Africa, but similar to global trends, the primary threat is the rate of habitat loss and degradation, leading to a loss of sustainable ecosystems to support and maintain biodiversity (DEA 2015; UNDP 2012).

The drivers of habitat loss and degradation vary across the country, but the main drivers at the national level include land clearing, either for cultivation and over-grazing in terrestrial and wetland ecosystems; invasive alien species in terrestrial and freshwater ecosystems; coastal development in coastal ecosystems; certain fishing activities in marine ecosystems; and mining in all ecosystems (DEA 2015).

Other pressures include changes in hydrological regime and poor water quality caused by pollutants; overutilization of rangelands and the unsustainable use of biological resources; changes in fire regimes, urban development, and illegal wildlife trafficking or resource use (DEA 2015; Skowno *et al.* 2019). Climate change is a documented threat across all realms, which would not only act as a direct driver of species loss and habitat degradation, but it will also exacerbate the effects of other pressures while altering the frequency, intensity, and timing of events (Skowno *et al.* 2019). Large-scale spatial, temporal, and compositional shifts in biodiversity have already been observed, therefore, preserving intact ecosystems and species populations, and maintaining PA connectivity is of paramount importance to ensure adaptive capacity across all realms.

An indirect driver of threats not often considered as a priority despite the potential ramifications is the disconnect between government officials and understanding the importance of protecting biodiversity. This disconnect could have direct impacts on frameworks and legislative policies being disregarded by officials outside of the environmental department. In 2010, a detailed stakeholder analysis amongst senior government officials was undertaken to determine why biodiversity is continuously undervalued and underfunded. The initial work revealed a lack of communication to be the underlying issue – people did not understand what it is, and therefore its importance to broader society, whilst scientists struggled to convey its importance (Desmet and Cloete 2014). In response, a national strategy was developed in order to demystify the terms

"biodiversity" and "protected areas" so that clear conceptual links between species, ecosystems, and people could be better understood.

2.8. Protected Areas in South Africa

Biodiversity is central to South Africa's national objectives of addressing poverty, inequality, and unemployment (Skowno *et al.* 2019). Continued investment in managing and conserving biodiversity is therefore essential to ensure long-term economic and social benefits. In the past decade, a significant effort has been made to protect underrepresented habitat types in South Africa while expanding its PA network (Skowno *et al.* 2019). To date, approximately 8.48% of its terrestrial land, 14.56% of its ocean area and 35% of its sub-Antarctic territory are formally protected (UNEP-WCMC 2020).

2.8.1. History of PAs in South Africa

The conceptual framework underpinning conservation in South Africa was introduced at the end of the 19th century by sportsmen who pressurised the government to halt the killing of the once-abundant herds of wildlife (Carruthers 2007). Game reserves were created in which wild animals were confined and the hunting of certain species prohibited for a certain period. The animals were guarded by a game warden and his junior staff, while public access was prohibited unless authorised. Without scientific policy or objectives framing the existence of these game reserves, their initial aim was merely to encourage the population of desirable species through the eradication of "vermin" predators and prevention of poaching, while allowing the surplus game to be hunted by fee-paying sport hunters. These reserves were however unstable entities with little management guidelines, declared on an *ad hoc* basis in the provincial gazette, and of low priority to the state (Carruthers 2007). Several years later and the growing awareness of national parks and natural sciences, the South African parliament passed its first National Parks Act in 1926, despite

strong opposition from state veterinary and agricultural scientists. With the passing of this Act, Kruger National Park, South Africa's largest PA, was also officially proclaimed (Carruthers 2007).

The formal involvement of private landowners in conservation was initiated with the change in legislation in the 1960s that promoted the decentralisation of wildlife ownership. In essence, landowners were allowed to utilise and manage wildlife on their property without government permits (Stolton and Dudley 2016). This transformed the attitudes of many landowners to view wildlife as an asset rather than a pest, resulting in an increase in scenic and in-situ conservation strategies. This, together with the declining profitability of agriculture, recurrent droughts, and the growth of international tourism created economic incentives for landowners to convert from cattle to wildlife ranches instead (Stolton and Dudley 2016). The first known form of voluntary conservation on private land was in 1978 when a group of farmers established a conservancy in KwaZulu-Natal with the encouragement of the former Natal Parks Board (now Ezemvelo KZN Wildlife) (Barendse *et al.* 2015).

Since then, the role of private land conservation and in particular private PAs has increased substantially with the realisation that the country's PA network falls short of representing all ecosystem types to ensure ecological resilience (DEA 2016), thereby also failing to meet international targets (CBD COP 10 Decision X/2; RSA 2018). A total of 13.43% of the country falls under varying degrees of conservation protection, comprising of state-, private- and communally owned PAs (DEA 2020). Since 79% of South Africa's total area is privately owned, it is not possible to solely rely on land acquisition to ensure ecological representation, therefore other conservation strategies are being utilised and relied upon (Desmet and Cloete 2014; Skowno *et al.* 2019). Consequently, South Africa's policies and legislation have evolved to facilitate the declaration of PAs on private and communal land, resulting in their integration into national

conservation strategies whilst reducing the capacity burden on the national government with PA expansion (SANBI 2018; Shumba 2019; Stolton *et al.* 2014; Wright *et al.* 2018).

2.9. Biodiversity Stewardship Programme

The majority of the formally declared state-owned PAs are Type II under the IUCN PA classification (UNDP 2012) while the remaining PA suite comprises various other conservation areas with varying degrees of formal protection including private nature reserves, game farms, mixed farming and ecotourism operations, either falling within the IUCN category Type III and VI (DEA 2015). Although many of these areas are not formally protected under NEMPA, they are nonetheless managed, at least partially for biodiversity conservation purposes, thereby contributing to the country's broader conservation estate and landscape conservation (DEA 2015). Policies and programs enabling these strategies include the National Environmental Management Protected Areas Act (57 of 2003) (NEMPA), the National Protected Area Expansion Strategy, and the Biodiversity Stewardship Programme (De Vos and Cumming 2019; SANBI 2018). The Biodiversity Stewardship Programme involves securing biodiversity priority areas that have been identified by national conservation plans and spatial assessments, by entering into agreements with private landowners, Communal Property Associations (CPA), and occupiers of communal land (De Vos and Cumming 2019; SANBI 2018). The programme is led by conservation authorities and supported by conservation NGOs (SANBI 2018). The agreement can either be voluntary or formal, and may include varying degrees of extension services such as assistance with management plans, technical support in species management, restoration of terrestrial and aquatic ecosystems, fire and invasive species management, and in some cases, fiscal benefits (SANBI 2018; Shumba *et al.* 2020). Stewardship does not displace people but rather encourages sustainable economic activity, which is of particular utility in multiple-use landscapes in which biodiversity priority

areas are found (SANBI 2018). Since its introduction, provincially in 2003 and nationally in 2007, biodiversity stewardship offers the most cost-effective mechanism for achieving national imperatives and improving land management, whilst offering a range of socio-economic benefits (SANBI 2018; Skowno *et al.* 2019; Wright *et al.* 2018). As such, it has become the key vehicle at which PA expansion is achieved. Government-funded biodiversity stewardship programmes have been developed in each of South Africa's nine provinces to ensure the implementation of the different types of stewardship agreements (SANBI 2018).

The importance and success of the programme are further emphasised with De Vos and Cumming (2019) reporting private nature reserves to be the biggest contributor to the protection of threatened and under-represented habit types in South Africa. Between 2008-2016, biodiversity stewardship was the only mechanism used for PA expansion for five provinces (SANBI 2018). More significantly, within that same period, the programme resulted in more than half a million hectares of important biodiversity land being declared as contracted private PAs (SANBI 2018; Skowno *et al.* 2019).

There are three categories of stewardship agreements (Table 2) all affording different levels of conservation protection, management requirements, land use restrictions, longevity, incentives, etc (Desmet and Cloete 2014; DEA 2020; SANBI 2018).

Table 2 - Biodiversity Stewardship Site Categories (adapted from Shumba 2019 and SANBI 2018*)*. Those in green are included in South Africa's formal PA network

TYPE OF AGREEMENT	DESCRIPTION	LEGAL MECHANISM	INCENTIVES
PROTECTED AREA			
Contract National Park/ Nature Reserve	National Park - Areas bordering state-PAs and are of the highest biodiversity value and managed either by SANParks or through a co-management agreement with private landowners, CPA's or the occupiers of the communal land. Nature Reserve - Formally declared primarily for biodiversity conservation, managed by provincial conservation authorities or private landowners, CPAs or the occupiers of the communal land. Binding period: 99 years or in perpetuity require a minimum declaration period of 99 years or in perpetuity, title deed restrictions and strict management regulations that restrict unsustainable management land use.	National Environmental Management Protected Areas Act (57 of 2003) (NEMPA)	Exclusion from municipality property rates. Reduced tax payments through the Biodiversity tax rules. Advanced technical support for habitat and species management. Ecotourism opportunities
Protected Environment	Less restrictive land use than National Parks or Nature Reserves with an option title deed restriction. Development restrictions apply as per Sections 49,50 and 41 of NEMPA	National Environmental Management Protected Areas Act (57 of 2003) (NEMPA)	
CONSERVATION AREAS			
Biodiversity Management Agreement	Enabled by NEMBA (Section 44) , an agreement is drawn-up between the Environmental Minster or MEC and organisation or organ of state who would be responsible for the implementation of the Biodiversity Management Plan (BMP) (Section 45) (NEMBA BMA's should be signed for at least five years	National Environmental Management: Biodiversity Act (Act 10 of 2004)/ Contract Laws	Assistance from provincial authority with management plans, technical support in managing species and habitats, and fire and invasive species management
PARTNERSHIP AREAS			
Conservancy	Informal areas with mixed land-use, dedicated to conservation on a voluntary basis. Typically comprised of several properties that have joined by removing internal fences, all with a shared biodiversity conservation vision. There is no timeframe commitment.	National Biodiversity economy strategy	Basic extension support for habitat and species management

Conservation Area	Land dedicated to conservation without any law influencing its management, protection implemented by landowners. Multi-land-use including ecotourism, hunting, and livestock- and crop farming. There is no timeframe commitment.		

Protected Areas consist of those with the highest biodiversity value, include contractual parks and nature reserves formally declared in terms of NEMPA and considered equal in protection status and permanence to state-owned PAs, thereby included in the country's PA estate (SANBI 2018; Desmet and Cloete 2014). As such these sites are of relevance to this study.

These areas can only be declared as such if they fulfil specific requirements as stated in NEMPA Section 23(2) and 28(2). They are characterised by strict land-use restrictions that prohibit extractive activities such as mining, requiring management plans, and monitored through annual management audits (Shumba 2019). These sites require a declaration period between 30-99 years or in perpetuity (SANBI 2018). Protected Environments also fall within this category and are less restrictive in terms of land use and declaration period (as per Sections 49,50 and 41 of NEMPA).

Conservation Areas are less restrictive than PA declaration, requiring varying degrees of commitment and a management plan. The most informal category, *Partnership Areas*, requires no formal agreement, duration, or intent. However, the site is registered by the provincial conservation authority or conservation NGO (SANBI 2018).

Fiscal benefits are by far the biggest incentive within the stewardship programme. Launched in 2015, South Africa's Fiscal Benefits project led to the inclusion of a new tax incentive into national legislation (BirdLife International 2020; SANBI 2018). The incentive allows South African landowners to claim a reduced tax based on the value of the property formally declared as a Nature Reserve or National Park (Income Tax Act (58 of 1962) Section 37D). To qualify,

however, the minimum duration of management tenure needs to be 10 years for biodiversity agreements, 30 years for protected environments and 99 years or in perpetuity in addition to title deed restrictions for contract nature reserves and national parks (Barendse *et al.* 2015; SANBI 2018).

The successful implementation of the Biodiversity Stewardship Programme requires collaboration across the spheres of government and the private sector (SANBI 2018). The Department of Environment, Forestry, and Fisheries (DEFF) is the main body responsible for setting national policy, guidelines, and providing support for the implementation agencies, which are predominantly provincial conservation authorities and South African National Parks (SANParks) (SANBI 2018). This collaboration is governed by the Environmental Right embedded in South Africa's progressive Constitution which details the governments' duty to take reasonable steps to prevent environmental degradation, promote conservation and ensure sustainable development (SANBI 2018). Strategies to uphold the Environmental Rights include expanding and connecting the PA network, reducing loss, and degradation of natural habitat in biodiversity priority areas, in some cases restoring biodiversity priority areas (SANBI 2018).

2.10. Policies and Legislative Context

The basic framework for environmental governance in South Africa is outlined in Section 24 (Environmental Right) of its Constitution (Act 108 of 1996) within the Bill of Rights (Republic of South Africa 1996). It states that:

"Everyone has the right

1. to an environment that is not harmful to their health or wellbeing
2. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

a. prevent pollution and ecological degradation
b. promote conservation
c. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development"

Subsection (2) of the Environmental Right embeds the ethos for the establishment of PAs– protecting South Africa's biodiversity for the benefit of current and future generations (Goosen and Blackmore 2019; Republic of South Africa 1996). Consequently, the management of PAs should promote not only the conservation of biodiversity but also ensure its persistence. The same would apply to any development or recreational activities within a PA that could potentially compromise its ecological integrity (Goosen and Blackmore 2019).

The key piece of legislation for environmental management in South Africa is the National Environmental Management Act (107 of 1998) (NEMA). NEMA is primarily a framework statute that gives effect to the Environmental Right by regulating the use of the environment by specifying a set of environmental management principles that must be applied by the government in all decision-making concerning the environment (Section 2). Of these the principle giving rise to the public trust doctrine (PTD) is most relevant to the objective of this thesis –

> 'The environment is held in public trust for the people, the beneficial use of envi ronmental resources must serve the public interest and the environment must be protected as the people's common heritage' (Section 2(4)(o)).

The significance of this principle will be discussed in detail in the next chapter.

Furthermore, in terms of PA management, the principles of relevance are found in Chapter 3 Section 11 and 12 Furthermore, which provides for environmental management and

implementation plans. These provisions form the foundation from which protected area management plans are derived (Goosen and Blackmore 2019). Chapter 6 Section 25(1) is of particular relevance as it provides for the incorporation of state-binding international environmental instruments that have not yet been included in the country's environmental legislation. The PA management plan would need to undergo frequent revisions in order for these multilateral agreements to be considered and incorporated (Goosen and Blackmore 2019). Similarly, international soft law (non-binding on the State) can also be considered as a guide and incorporated, where relevant, into environmental decision-making.

In addition to the environmental management principles, NEMA also makes provision for specific environmental legislation in key spheres comprising the environment, two of which are of prime relevance (NEMBA Section 2(a); NEMPA Section 2(a)):

a. The National Environmental Management: Biodiversity Act (10 of 2004) (NEMBA) provides for the management, conservation, and monitoring of South Africa's biodiversity within the framework of NEMA; focusing specifically on species and ecosystems that warrant national protection, all while ensuring the sustainable use and equitable sharing of biological resources. It achieves this through the development and implementation of the national biodiversity framework (NBF) (Chapter 3). The Act's objectives are achieved with the establishment and maintenance of the South African National Biodiversity Institute (SANBI). NEMBA also makes provision for ratified international agreements binding on the Republic, such as management effectiveness agreed to in COP10, to be included in management plans where relevant (Section 2(b) and 5).

b. The National Environmental Management: Protected Areas Act (57 of 2003) (NEMPA) is the primary legislative framework for the declaration and management of ecologically

representative PAs through cooperative governance (Section 2(b)). It provides strict specifications for the management of various types of PAs (Chapter 3), including requirements for management plans (Section 41), management according to specified objectives (Section 40) and monitoring and reporting requirements (Section 3(a)) (NEMPA 57 of 2003; UNDP 2012). An approved management plan, which is guided by norms and standards (Section 11) in accordance with its objectives and specific reasons for its declaration, is used to evaluate the management of the PA by the applicable government department.

In 2016, the Minister of Environmental Affairs published Norms and Standards (N&S) for the Management of PAs in South Africa in terms of Section 11 of NEMPA. The purpose of the N&S is to: ensure PAs fulfil their objectives as set out in Section 17 of NEMPA; ensure human-induced disturbances both within and outside of PAs are avoided, or at least minimised and remedied; provide goals for PA management authorities and ensure PAs are managed effectively (SANBI 2018).

PAs that are recognised under NEMPA (Section 9) include:

1. Special nature reserves, national parks, nature reserves (including wilderness areas) and protected environments. Declaration of these PAs is undertaken in terms of NEMPA;
2. World Heritage Sites as declared in terms of the World Heritage Convention Act (49 of 1999);
3. Marine protected areas as declared in terms of the Marine Living Resources Act (18 of 1998);
4. Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act (84 of 1998); and

5. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act (63 of 1970).

Conservation areas not declared under NEMPA but contribute to South Africa's PA estate include: Biosphere reserves; Ramsar sites; Stewardship agreements; Botanical gardens; Transfrontier conservation areas; Transfrontier parks; Military conservation areas and Conservancies.

Both PAs and Conservation Areas are further divided into designation sub-types (DEA 2020) (see Appendix A).

2.11. Public Trust Doctrine

Analysis of South Africa's environmental legislation reveals its roots within the concept of public trusteeship. Due to the fact that this is a novel concept in South African law, it first needs to be contextualised and its history examined (Van der Schyff 2011).

The concept of public trusteeship often referred to as the public trust doctrine (PTD), encapsulates a sovereign's fiduciary duty to hold the environment and certain natural resources in trust for current and future generations (Van der Schyff 2011). Another definition describes it as stewardship which provides a legal mechanism to ensure that the rights of the nation are protected by assigning such rights to the State as trustee (Lubbe 2019).

While there are contesting theories as to the origin of the PTD, it is most widely accepted to be rooted in ancient Roman customary law, originating from the practice by fisherman using the communal seashore to dry their nets (Lubbe 2019). Roman law distinguished between that which belonged to no one, *res nullius* and that which was common to mankind, *res communes* (Feris 2012). Its application was predominantly concerning the ownership of water, where surface water was considered *res communes* and could therefore not be appropriated for private use. This

concept was later incorporated into the *Magna Carta* and the English common law which appointed the Crown as the trustee of public property (Blackmore 2018a; Sagarin and Turnipseed 2012). In English law, the King owned all "public" land, Ras a means to reserve them for hunting grounds for himself and select gentry. This form of ownership evolved into one which the King held the land on behalf of his subjects and with this the incorporation of the notion of the PTD into English law

The PTD was inherited by countries that held an Anglo-Saxon legal system (Blackmore 2015), including the United States of America (USA) where it evolved to take on a profound meaning within the context of natural resources law (Feris 2012). It was through reasoning and with a greater understanding of the intricate dependence of people on the environment that allowed the PTD to expand to its modern-day concept which requires a custodial commitment from the State to not only guard natural resources against unlawful appropriation by private citizens but also to protect and conserve it.

In the USA, the PTD was originally used to determine the ownership of navigable waters (Van der Schyff 2011). It was only in the 1970s after a law review article by Sax (1971) which argued for a broader recognition of the PTD, that initiated its evolution to its modern-day counterpart. As summarised by Baer (1988), Sax claimed that for the PTD to be viable, it had to encompass three concepts: "(1) vested in the public; (2) enforceable against the government; and (3) harmonies with environmental concerns". This philosophical foundation, increased knowledge and the unfolding of case law resulted in the extension of the doctrine to environmental governance (Blackmore 2018a; Feris 2012).

Contrary to how the PTD developed in the US, other countries, including South Africa, have either directly or indirectly embedded the doctrine into their constitutions or environmental

law, or both (Blackmore 2018a). In South Africa, the PTD has been found to originate from multiple bloodlines, with a significant/marked? African influence than a Western one. The significance of this observation relates to the fact its application remains ambiguous and therefore challenging, particularly because, in the years since the promulgation of South Africa's Constitution, there has been little academic and legal recognition of its provisions (Blackmore 2018b). As a result, the nature and application of the doctrine remains in its infancy, with its role and importance in environmental decision-making still to be realised (Blackmore 2018b). However, with South Africa's biodiversity under significant threats from impacts of land transformation and unsustainable use, there is an urgent need to rediscover the value of the doctrine as a means of enabling both the government and the public to ensure added protection to the country's natural heritage (Blackmore 2018b; Sagarin and Turnipseed 2012).

2.11.1. Development of state custodianship in South African environmental law

As highlighted above the fiduciary context of the PTD is primarily incorporated into South Africa's environmental laws by way of Section 24 of the Bill of Rights (Republic of South Africa 1996) in the country's Constitution (Act 108 of 1996). The adoption of this Environmental Right into the country's constitutional law represented an understanding of the importance of conservation and its inextricable link to people's health and wellbeing (Blackmore 2018b).

Section 24 compels government, as a responsible custodian, to pass "reasonable legislation for the protection of the environment, prevent pollution and ecological degradation, promote conservation, secure sustainable development and ensure compliance with this legislation". Plainly said, the government has a fiduciary duty to ensure that the natural environment is used sustainably, in a manner that ensures inter- and intragenerational equity (Blackmore 2018b).

The White Paper on Environmental Management Policy released in 1998 (Gazette 746 of 1998), which formulated the policy on the management of the environment, unpacks the fiducial duties binding the government to its public trust and environmental custodianship obligations (Blackmore 2015; Lubbe 2019). This policy also laid the foundation for several statutes to incorporate the PTD directly into environmental and natural resources law (Van der Schyff 2016), including the NEMA which serves as a framework Act for regulating the use of the natural environment (Chapter 3 Section 11 and 12) (Blackmore 2018b; Feris 2012). NEMA aims to achieve the protection of the Environmental Right through the application of several fundamental principles the government must apply to all decision-making concerning the environment (Section 2) (Goosen and Blackmore 2019). NEMA also gives rise to specific environmental legislation that regulates biodiversity, PAs, the coastal zone, waste and air and water quality (Blackmore 2018b).

The doctrine is expressly defined and embedded in each of these fundamental principles (Blackmore 2018b). Within NEMA, the public trust is referred to as 'the people's common heritage'. By associating biodiversity with heritage, it defines the concept of it being held in trust, handed down by tradition, from one generation to the next as an object of intrinsic value (Blackmore 2018a). Consequently, the concept of 'sense of place' and similar intrinsic values of biodiversity are also brought into consideration. This coincides with reference to 'wellbeing' in Section 24(a) of the Constitution. Introducing these associations opens the door to include such concepts into the growing understanding of the PTD (Blackmore 2018b).

Apart from NEMA, other statutes expand the fiduciary responsibility as in Section 3 of both the NEMBA and NEMPA, referring to the State's role of 'trustee' of biodiversity and PAs.

2.11.2. Critical analysis of the State's duties as custodian of natural resources

The Constitution gives every citizen the Right to have the environment protected through measures which ensure ecologically sustainable development (Lubbe 2019). The principle of sustainable development, as expanded upon in NEMA, is the State's greatest challenge. A developing economy and the need for economic sustainability inevitably places increasing pressure on the country's natural resources and ecosystems. With any development, the government is bound to strive to achieve a reasonable balance between socio-economic development and biodiversity protection, in order to safeguard the integrity of the natural environment (Blackmore 2020; Lubbe 2019). As part of the principle that development must be socially, environmentally, and economically sustainable (Section 3), aptly referred to as the three pillars of sustainable development, the precautionary principle requires that negative impacts on the environment and people's environmental rights must be anticipated and prevented (Section 2(a)(viii)). The environment cannot be significantly compromised in favour of economic, social, or political gains. The decisions made should reflect the best possible environmental option - one which provides the greatest benefits or causes the least damage at an acceptable cost to society, both in the long- and short-term (Lubbe 2019). NEMA also embraces the government's retrospective duty to restore previously degraded ecosystems. Disturbances of ecosystems and loss of biological diversity as a result of the State's previous decision (or lack thereof) would need to be remedied in order to restore the trust objects (in this case the country's biodiversity) that have been lost or eroded. The same would apply to future potential impacts such as climate change or fragmentation, where the disturbance has taken place, but the residual impact has yet to become apparent. (Blackmore 2018b).

It is argued, that from a trust entity and the NEMA principles perspective, the government is required to do more than simply avoiding significant threats by stopping short of species extinction (Blackmore 2018b). Knowing when to stop exploiting a natural resource before its integrity is compromised and the activity becomes unsustainable, known as the sustainable threshold or tipping point, is another challenge the government faces. Identifying this threshold is often limited by a general lack of understanding of an ecosystems' absorptive capacity, and the stochasticity of the environment. Consequently, the cautious approach principle must be applied in conjunction with the risk-averse principle, and in doing so, introduces the precautionary principle to environmental decision-making (Blackmore 2018b).

The use of biodiversity offsets has been recognised as a powerful tool to establish a balance between development and conservation. By compensating for the residual impacts on biodiversity which have resulted from development or land-use change, the latter can be considered sustainable (Blackmore 2020). The key principle underpinning the concept is one of 'no-net loss' or 'net gain' by securing or recreating an equivalent to that which was lost. This requirement of a 'no-net loss' outcome is also considered a fiducial duty of the State, an apparent similarity to a financial trust. The establishment of PAs can be viewed as a biodiversity offset and would, therefore, need to persist. It should, however, be mentioned that total reliance on offsets cannot be considered a mechanism to achieve conservation targets nor should existing PAs be used as economically convenient receiving areas for inappropriate development (Blackmore 2020).

2.11.3. The link between the PTD and MEEs

The establishment of PAs must contribute to achieving the objectives of NEMPA. However, PAs are subject to human-induced impacts such as recreational and consumptive use of natural resources, including the development of tourism-related facilities (Blackmore 2018b). It is

these actions, either individually or cumulatively, that have a negative impact on the PA's integrity and the biodiversity therein. It is therefore important to ensure that decisions taken within PAs result in biodiversity protection alone, or risk undermining the conservation agencies' ability to meet their trusteeship obligations (Blackmore 2018b). NEMPA specifically provides for the establishment of indicators, as per the PA management plan, against which management performance in achieving the objectives of the Act is monitored and reported, thereby facilitating the application of the PTD.

While the PTD provides government officials with a mechanism to anticipate and regulate unsustainable resource use, its long-term effectiveness can only be guaranteed when the public(the beneficiaries of the trust) is empowered (through the courts) to hold the trustee (the government) accountable for decisions made that affect the trust entity (Blackmore 2018b). However, demonstrating the government's faithfulness to the doctrine remains a challenge. So too is determining whether the government has been compliant in meeting their fiduciary duties to protect the public trust entity (Blackmore 2018b). Therefore, it is determined that both parties stand to benefit from a mechanism to meet these needs, MEEs in considered such a mechanism.

Before MEEs were introduced to PA management, the public had little grounds on gauging whether the government has been faithful to their fiduciary duties to protect the public trust entity (maintaining PA integrity and safeguarding its biodiversity) (Blackmore 2018a). If used according to best practice guidelines to ensure credibility, the MEE can become a powerful mechanism to measure compliance of the government in meeting its fiduciary duties. With increasing population growth and subsequent development, the availability of MEEs tools to enforce the PTD is going to become more imperative to ensure a balance between future socio-economic development and environmental protection. However, this will only be possible if MEEs are made publicly

available, a contentious issue in itself. Because many PAs are reliant on international funding, management may be weary of MEEs being used as performance scorecards where poor scoring results in them losing their funding or, worst case, their employment. Thus, it is important to ensure mechanisms are in place to ensure the accuracy of the scoring. Such a mechanism may be an independent reviewing of scores to ensure they are not deliberately inflated (or deflated) by the assessors or adjusted to serve a particular purpose (Eklund 2016).

The government also stands to benefit from the use of MEEs as it provides the State as custodian, the opportunity to exercise its fiduciary duty of safeguarding biodiversity present in a PA. If all PAs were to score well, it stands to reason that the government has met its fiduciary duties. This is of particular relevance within private PAs as the government is obligated to prevent any individual from unsustainably exploiting the environment for private profit or exclusive benefit (Blackmore 2016). Furthermore, a general lack of empirical data in understanding the consequence of decisions taken, weakens the government's ability to abide by its fiduciary duties, MEEs, if performed correctly, have the potential of expanding the knowledge required for identifying the sustainable-use threshold, thereby promoting and improving evidence-based decision-making, which will play a pivotal role in mitigating related pressures and threats as PAs become more reliant on ecotourism for revenue (Blackmore 2018b).

Whether the government has linked the implementation of MEEs as a tool to facilitate their fiduciary duties of safeguarding biodiversity present in a PA and ensure its persistence for the benefit of future generations, is unknown. It is however clear that the mere presence of the PTD is not sufficient to ensure the protection of the trust entity but rather needs to be enforced by legislation and other corrective measures (e.g. the courts). Therefore, the importance of the government ensuring PAs are managed effectively should not be underestimated, not only for the

persistence of the biodiversity within but also to embrace its retrospective duty to restore previously degraded ecosystems, including those of future potential impacts from i.e. climate change or ecosystem fragmentation. One can also argue that by ensuring PAs are effectively managed, also allows the government whether it has met its fiduciary duty of protecting South Africa's natural heritage.

2.12. Environmental Management Framework

The state's responsibility to adhere to its duties is operationalised through the National Biodiversity Strategy and Action Plan (NBSAP), an overarching strategy used for the overall conservation, management, sustainable use of biodiversity and the equitable sharing of benefits (DEA 2015). It identifies six strategic objectives, each with their own set of prioritised medium or long-term targets. Strategic Objective 1, Outcome 1.1 is the most relevant to this study i.e. "The network of protected areas and conservation areas includes a representative sample of ecosystems and species, and is coherent and *effectively managed."* (DEA 2017, emphasis added).

The NBSAP is not legislation, but guidance that has been designed to align with other national policies and frameworks with a broader sustainable development agenda. It is also a requirement of the CBD for all contracting parties and outlines how South Africa will fulfil the agreed-upon targets of the CBD in order to contribute to the global sustainable development agenda (DEA 2015).

The CBD targets relevant to this study include (RSA 2018):

- by 2019, 13.2% of terrestrial land registered within the conservation estate, comprising of different levels of protection including areas of mixed-use land such as buffer areas around biosphere reserves and biodiversity stewardship sites
- by 2028, 10.8 million hectares of terrestrial land falls within PAs

- by 2019, 90% of state-PAs assessed with METT score above 67%

Furthermore, the most relevant national policies and frameworks of relevance include (DEA 2017) (Figure 2):

1. National Development Plan 2030 (NDP) which is the country's over-arching development plan till 2030 (DEA 2017; UNDP 2012);

2. National Biodiversity Framework (NBF), a requirement under the Biodiversity Act Section 38(2) to coordinate and align efforts of all stakeholders involved in conserving and managing South Africa's biodiversity; and

3. National Protected Area Expansion Strategy (NPAES), a requirement under both the NEMPA and the NEMBA, aims to achieve cost-effective PA network expansion to improve ecological representation for increased ecological sustainability and resilience to climate change (DEA 2017). It was developed after the first national-wide study in 2004 revealed several ecosystem types and ecological processes were severely underrepresented in South Africa's existing PA network (DEA 2015). This was a result of the country's biodiversity being unevenly distributed and the past ad hoc manner at which PA was established (De Vos

et al. 2019). The NPAES is required to be integrated into provincial PA expansion strategies and policies.

Environmental management and the implementation of the various strategies occurs within the three spheres of government - national, provincial, and local, and operate as "distinctive,

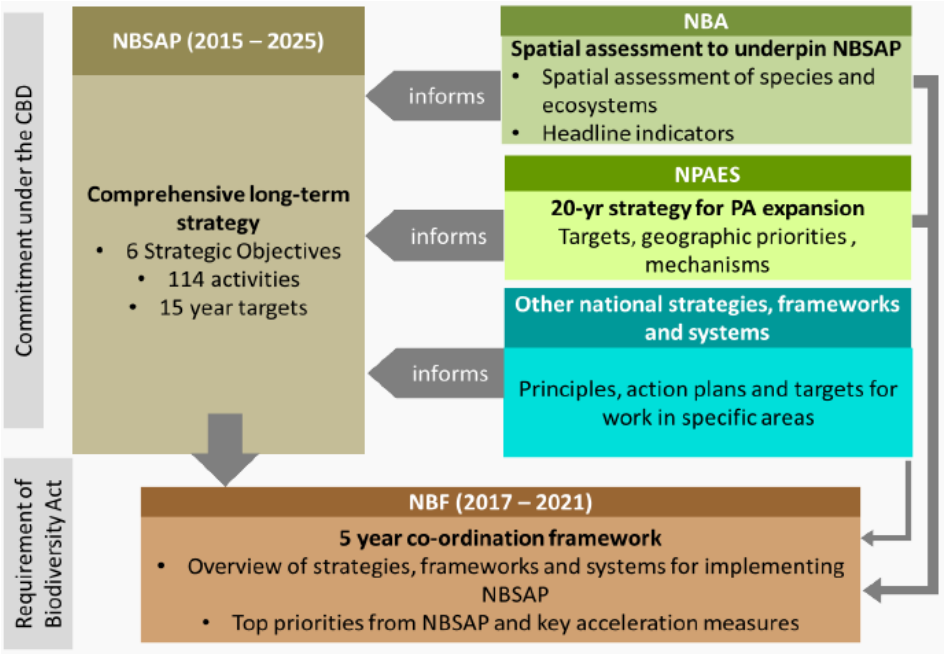

Figure 2- Structure of South Africa's policy and legislative framework (DEA 2017)

interdependent and interrelated" spheres through co-operative governance, a principle emphasised in the Constitution (DEA 2015, 7; NEMA Section 11).

Before the development of South Africa's current environmental legislation, The White Paper on Environmental Management Policy (Gazette 749 of 1998) found the country's state of PA management to be fragmented, polarised and ineffective due to both a lack of coordination between departments and integration of biodiversity policies into national decision-making. However, despite the publication of NEMBA to give rise to cooperative governance, an evaluation undertaken in 2012 to determine South Africa's "Action Plan" to meet CBD requirements, found similar management problems (DEA 2012). Instead of ecosystem or bioregional factors being used

to assign management responsibilities for PAs, historical factors are used, resulting in proximate PAs falling under different management authorities (RSA 2012).

Furthermore, PA management authorities are required to work within multiple legal systems, resulting in different regulatory requirements being applied on one piece of land. Overall, the level of diversity among different management authorities is not indicative of a coordinated approach to conservation management (DEA 2012). Without the government improving its management approaches, landscape conservation efforts will not be successful.

2.13. Protected Areas Management Effectiveness in South Africa

There has been a visible decline in resource allocation towards monitoring programs in South Africa (Skowno *et al.* 2019), in addition to key monitoring datasets being outdated and insecure. As a result, other methods of measuring conservation success are required to allow adaptive management to occur.

South Africa has been applying various PAME tools to several of its state-PAs since 2001 due to funding agency obligations (Goodman 2003). However, as a contracting party to the CBD, in 2010 South Africa opted to rigorously apply an adapted version of the METT to the majority of its state-owned PAs (METT- SA Version 1). The outcome concluded that on average, the management effectiveness of most of the 253 PAs evaluated, fell below international standards, indicating non-compliance with NEMPA (Cowan *et al.* 2010). Total scores ranged from 10% to 86%, with an overall mean of only 49%. Using the score-range suggested by Leverington *et al.* (2010), of the 253 PAs evaluated, 108 (47%) scored less than 50% suggesting either inadequate or basic management with significant deficiencies, 121 (53%) scored between the 51-67% level for basic management, whilst only 31 (14%) scored above the 67% level for sound management.

Following these poor results, for the next three years, an extensive effort was made to improve management effectiveness within the evaluated PAs. However, the continued rise in scores prompted an audit in 2013 to determine its reliability (DEFF 2016, unpublished). Several issues and weaknesses were highlighted as nationally aggregated over-scoring were found. One factor attributed to over-scoring was that Conservation Management Authorities (CMA) had adapted the tools to suit local conditions and challenges (DEFF 2016, unpublished). As a result, the need to ensure an adapted, standardised national tool was deemed crucial going forward. Through a consultative process with all provinces, including using the recommendations gained from the audit, an improved and adapted METT version was released, METT-SA Version 3 (DEFF 2016, unpublished) (hereafter referred to as METT-SA 3a). This version is considered to strongly align with most types of PAs, thereby ensuring its suitability for i.e. biodiversity stewardship sites (DEFF 2016, unpublished). As anticipated, the average scores decreased with the release of the improved METT-SA 3a. However, in 2017 scores had improved again with 44% scoring above 67%, 41.6% between 33-66%, 6.8% scored below 33% while 7.6% of PAs still had not been assessed (DEFF 2016, unpublished).

Improvements to the tool include the release of best practice protocols, increasing the indicators from 30 to over 70, including more specific questions, and adapting the scoring range so that 3 indicates best practice and requires " verification", and 2 sound management. A separate standard list of pressure and threats as that used in the RAPPAM system is also included to allow the relative influence of each identified pressure and threat to be tracked over time (Cowen *et al.* 2010). Furthermore, METT-SA 3a now identifies priority areas and the subsequent steps to follow to allow for improvements while problems beyond management control are also highlighted. One

remaining limitation is the need to develop a system that will respond to assessing sites with multiple designations or covering different kinds of PAs (UNDP 2012).

While it is encouraging that South Africa appears to have the ability to manage its state-PA network effectively, there is still the need to develop a monitoring and evaluation system that will be understood and more importantly implemented by all conservation agencies (UNDP 2012). This is especially relevant for PAs not managed by the state. Currently, METT has not been introduced into the majority of South Africa's biodiversity stewardship sites (SANBI 2018, Practitioner). Instead, an annual management plan audit is conducted to ensure that the activities of the Annual Plan of Operation (APO) are being implemented and allow for new management targets to be set (SANBI 2018).

Consequently, there is still limited knowledge on the effectiveness of *inter alia* private PAs in conserving biodiversity, particularly at regional and national scales (De Vos and Cumming 2019). It is, therefore, in the interest of DEFF to establish a system that implements and tracks management effectiveness within private PAs.

3. Methods

This chapter provides a detailed description and rationale for the methodological approach used in this study. The research process consisted of three sections: 1) using a questionnaire to gauge the perspectives of various PA managers and practitioners; 2) applying the MTRA tool through a workshop-adapted questionnaire, and 3) data analysis.

3.1. Research Design

3.1.1. Justification for design

A comparative and investigative study design was chosen to investigate the strengths and weaknesses of two PAME tools (METT-SA 3a and MTRA). My unit of analysis was a select number of private PAs which have used the METT-SA 3a and a more limited comparison of one which has utilized both tools. The initial study design did not have a large social-science component, but questionnaires were later utilised to gain a better understanding of the challenges with PAME implementation in South Africa.

3.2. Qualitative Methods

3.2.1. Questionnaires

Qualitative research sets out to capture subjective perceptions of a specific topic, aiming to address the "how" and "why" through unstructured data collection methods (Kabir 2016). This plays an important role in impact evaluation by providing information to understand the processes behind observed results.

3.2.2. Gaining the Perspectives of private PA Management Stakeholders

To gain the perspectives of various management stakeholders involved in the biodiversity stewardship programme, an open-ended questionnaire was used (Appendix G). The questions pertained to the general application of PAME and the specific implementation of METT-SA 3a within private PAs. Open-ended questions are particularly useful for exploratory studies such as

this, as it makes no presumptions of the kinds of answers participants might provide, but rather allows them the opportunity to respond in their own words, adding rich context (Given 2008).

A questionnaire was sent out to two different groups – (1) four wardens or conservation managers in charge of the private PA management (hereafter referred to as warden or manager), and (2) five practitioners or experts working in biodiversity stewardship (hereafter referred to as practitioner, provincial officer or coordinator).

The questionnaire included a total of fifteen questions with a slight variation between the two groups in terms of the use of METT within a specific PA. The questions were all open-ended as the intention was to determine how the tool has been implemented within private PAs, if at all; how many private PAs are registered within those provinces; the participants' general opinion regarding METT; challenges faced with its use; suggested changes; and if any research is being undertaken to find links between management input and biodiversity outcomes. The questions were analysed using content analysis in which all items representing a common theme were grouped together and major themes identified (Wright *et al.* 2018).

3.3. Quantitative Methods

3.3.1. Justification for tool choice

The Threat Reduction Assessment (TRA) is a simple tool for conservation managers to use to measure the impacts of their efforts by using changes in identified threats as a proxy of conservation impact (Margoluis and Salafsky 2001). The key principle of the TRA as an evaluation tool is that if the threats are mitigated, management would have succeeded and vice versa. To increase its robustness, it was modified (and renamed to Modified TRA) by standardising threats using the IUCN-CMP threat classification and allowing for the inclusion of worsening or emerging threats (Anthony 2008).

The MTRA was chosen for its ease of use and the likelihood that for private PAs which do not have the same resource capacity and obligations as state-owned PAs, a tool only focusing on threats would be more beneficial than one with a wider focus. This is supported by focus-group studies finding a lack of political support and resource capacity to potentially be the greatest challenge facing biodiversity stewardship (Wright *et al.* 2018). Without adequate financial support, provincial departments are not able to secure permanent, suitable qualified extension officers (Wright *et al.* 2018). Consequently, without sufficient resources, an in-depth, resource-heavy PAME tool will either only be done on an *ad hoc* basis and become a "paper exercise", or best practice guidelines will not be followed during its implementation and the scores will be unreliable.

The rationale is that within private PAs, the MTRA can be used as the baseline MEE tool to first evaluate which threats are present under current management strategies. Because biodiversity stewardship sites undergo an annual management plan audits facilitated either by an NGO or provincial officer, the MTRA could add value without being an administrative burden. Once improvements are made to those threats, a more in-depth assessment can be applied, thereby allowing the MTRA to act as a complementary tool. As acknowledged by Carbutt and Goodman (2013), a threat and pressure assessment are considered to add value to the monitoring, evaluation, and mitigation component of the adaptive management framework.

3.3.2. MTRA Tool

The digital workshop questionnaire "package" was developed and contained a detailed explanation of how the tool was to be used (Appendix B). The "package" was sent to the participant and contained two files:

1. A Microsoft Word document detailing the purpose of the tool, its components, a detailed guide on its application and a questionnaire to complete at the end. The questionnaire was used as a substitute for the discussion component of the workshop (Appendix F); and
2. A Microsoft Excel document in which the participant would enter the data to allow the TRA Index to be calculated automatically. Two worksheets were also included in which the identified threats had to be defined and a 100% mitigation for each threat explained. Furthermore, supporting documentation or information had to be provided when threat change was identified.

The MTRA was implemented within one private PA (hereafter participant) situated within the Greater Kruger. Although this method is very restrictive and prevents the thorough application of the PAME tool, it was the only feasible option due to the Covid-19 lockdown restrictions in South Africa. Once the participant completed the MTRA, a questionnaire was used to gauge the participant's opinion regarding its use, including its value in comparison to METT-SA 3a. The questionnaire included both open-ended and closed-choice questions (factual questions requiring negative/positive statements using the Likert scale; yes/no responses or opinion and attitudinal questions).

3.3.3. MTRA Workshop

The participant was first asked to describe the site in detail, indicate the chosen assessment period to assess threat mitigation, the position of the participant on the private PA, and his/her period of employment. Threats that were present at the beginning of the assessment period were identified as well as any which had emerged during the assessment period. From this list, a maximum of ten threats was chosen and categorised according to the IUCN-CMP list provided. To prevent loss of information, once the threats were standardised, the participant was asked to

describe identified threats in detail to allow for a standard definition for each threat (Appendix C). To avoid confusion, a 100% threat reduction was defined as "complete eradication of a given threat" (Anthony 2008), unless total threat elimination was not considered feasible, for which a different definition was produced. Each threat was then ranked according to its *Area, Intensity,* and *Urgency* to gauge their relative importance (Appendix D). No equal scoring is possible, and the minimum score starts at 1. All scores per threat were summed to calculate a *Total Ranking*. To assess the extent to which management activities had been successful in mitigating a threat, the participant was asked to estimate the percentage each threat had either increased or decreased over the assessment period (Appendix E). If the threat had decreased, it was assigned a positive score with +100% indicating the threat had been eliminated. If a threat had increased since the start of the assessment period, a negative score was assigned. This score has no lower bounds whereas a newly emerged threat is given a score of -100%. The *Total Ranking* scores for each threat were multiplied by the percentage of the threat to calculate a raw score for that threat (*Raw Scores*). The *Threat Reduction Index (TRA-I)* was calculated by dividing the sum of the *Raw Scores* for each threat by the *Total Rankings* of all the threats and multiplying by 100: (*TRA-I = Total Raw Scores/Total Rankings x 100*). A positive TRA-I indicates conservation efforts resulted in a decrease in combined threats, conversely a negative value indicates threats worsened over time. Once the score was calculated, a questionnaire was filled out in order to gain the participant's perspective regarding MTRA, its results, and how it compared with that of METT-SA 3a.

3.3.4. Comparing the MTRA with the METT-SA 3a

The participant's 2018 METT-SA 3a scores were obtained to allow comparison with the calculated TRA Index and determine its added value. First, the objectivity and value of the 2018 METT assessment was determined using the "best practice" framework suggested by Carbutt and

Goodman (2013). The framework consists of the six components included within the IUCN-WCPA MEE framework. For the TRA Index, guidelines set by Margoluis and Salafsky (2001) were used. These frameworks include guidelines on how each assessment should be undertaken to ensure rigorous results and a reasonable reflection of PA management effectiveness. The framework was used in combination with the questionnaire and worksheet completed by the participant.

To determine the value of the MTRA in comparison to the METT-SA 3a two comparative analyses were undertaken:

1. The strengths of both the MTRA and the METT-SA 3a were investigated to ensure a more comprehensive comparison of the tools. In determining the strengths of the MTRA, its position among the relevant indicators chosen for the METT-SA 3a was investigated, using an organogram for reference (Figure 4). This would allow one to deduce whether it could be used as a stand-alone tool to be used alongside the annual management plan audit and/or whether it could strengthen the value of the METT-SA 3a.
2. The separate pressures and threats assessment (adapted from the RAPPAM) that is completed alongside METT-SA 3a was compared with the MTRA to determine the strengths and weaknesses of both tools.

3.4. Research Ethics

In line with Central European University's Ethical Research Policy, a checklist was completed to show awareness of and compliance with core research ethics principles in the design and conduct of my research. The checklist was also used to identify any potential ethical issues, such as including the details of the questionnaires using pseudonyms to protect identity.

A confidentiality agreement was used to obtain sensitive data for the comparative analysis section of the study.

3.5. Limitations of the methodological approach

My study's sample size is the greatest limitation, the onset of Covid-19 and stakeholder exhaustion resulted in only one participant agreeing to partake in my study. It would have been preferable to have both a wider range of participants (private PAs) and stakeholders from each private PA, to allow a more in-depth comparison with the METT-SA 3a scores and comply with best practice guidelines (Carbutt and Goodman 2013). This would have allowed a deeper understanding of the challenges present during the implementation of both tools, particularly between different private PAs in terms of objectives and management structures. A larger sample size would also have afforded me a better understanding of the different views with regards to the feasibility of implementing the MTRA instead of METT-SA 3a. Since I only had one participant, I have a one-sided view of the challenges and potential value of the MTRA.

Furthermore, not being able to introduce the MTRA tool in person and oversee its implementation carries several drawbacks, including not being able to include the GIS component suggested by Milatović *et al.* (2019). However constant communication with the participant afforded me some degree of control with regards to ensuring a complete understanding of the tool, but not on encouraging a thorough analysis of threats present on the private PA.

With regards to the stakeholder questionnaire, not being able to conduct interviews in person also prevented me from gaining a better understanding of the various challenges associated with private PA management and the use of METT-SA 3a, in terms of not being able to ask follow-up questions or ask the participants to elaborate. I also had to be mindful of the possibility of misinterpretation when using open-ended questions.

4. Results

The first section includes the data from the qualitative questionnaires that were sent out to the respective stakeholders and summarised according to themes. The second section includes the quantitative data obtained and analysed with the completion of the MTRA within the participating private PA. This section also includes a brief overview of the participant's opinion regarding the MTRA in comparison to the METT-SA 3a.

4.1. Qualitative results

A total of eight participants completed the questionnaire, of which three were private PA wardens or managers, two provincial biodiversity stewardship officers, two biodiversity stewardship coordinators, and one practitioner. One of the coordinators only answered specific questions pertaining to the government. The qualitative data was divided into six themes: (1) implementation of METT; (2) "best practice" framework; (3) extension support; (4) supervising of scores; (5) opinions regarding METT; and (6) challenges of the current METT version.

4.1.1. Implementation of METT

In the ten years since the initial introduction of METT within state-owned private PAs in South Africa, METT has yet to be introduced into private PAs on a broad scale. While several private PAs across the different provinces have used the tool, sometimes multiple times, the provincial authorities are yet to "…integrate the private PAs into their annual METT assessments schedules". Assessments are currently only being done in an "…*ad hoc* manner by NGOs or provincial staff supporting private PAs…" (Practitioner). Resource limitations in terms of funding, skilled staff, and time were said to be the main reasons for this (Coordinator I; Practitioner). A closer look at the local level, specifically within the Greater Kruger region further indicates different assessment frequencies, specifically those who have signed a Cooperative Agreement with Kruger National Park and have been advised to implement METT annually. Several sites

have only undergone one assessment in the last three years (Warden I; Warden II), while another site has undergone four in the last six (Warden III). An additional discrepancy appears with the application of the separate pressure and threats assessment, as some private PAs had completed it alongside the METT assessment, while others had not (Manager; Warden I).

In the Western Cape province, introducing the METT into private PAs is currently not a priority as the provincial environmental body, CapeNature, does not have the staff to facilitate the project (Provincial officer II). Rather, management is monitored through annual management plan audits which involves a meeting between CapeNature and the landowner/manager to discuss achievements against the APO, after which a new APO is set up "…where management activities are prioritised according to funding and resources available and responsibilities are agreed on.". CapeNature has 61 declared Nature Reserves and 3 declared Protected Environments. They also have the task of assisting the "181 older private protected areas that were established under the Nature Conservation Ordinance" with a verification project to ensure they are brought up to standard and are compliant with NEMPA. In the Eastern Cape province, the Eastern Cape Parks and Tourism Agency had planned to undertake METT assessments in 2020/2021, but training has been postponed because of Covid-19 restrictions (Provincial officer I).

While the implementation of METT is largely absent throughout the country, similar to the Western Cape, annual management plan audits are used nation-wide to evaluate the management of all biodiversity stewardship sites (Practitioner).

4.1.2. "Best practice" framework

Based on how the METT has been implemented within most provinces, the conditions do not fulfil most of the criteria recognised by the "best practice" framework suggested by Carbutt and Goodman (2013). Therefore, scores should be interpreted with caution in light of skewed and

incomplete stakeholder representation, minimal peer review, or a wide range of opinions and perspectives.

It appears that stakeholder involvement per assessment range between only "reserve representatives" (Coordinator I), "executive committee members" (Warden II), the NGO partner (Practitioner), and "possibly (and where appropriate) other NGO partners who can provide input to the management of the [private] PAs or Department of Agriculture, where there may be a livestock grazing component." (Practitioner). Both benefits and 'drawbacks' of each method was noted, i.e. "a group is good for peer review and collective understanding, as well as being less resource (time) intensive" (Coordinator I), external stakeholders are rarely involved in the assessments (Warden I), and on some sites stakeholder involvement is inconsistent (Warden III).

4.1.3. Extension support

The amount of support offered to the private PAs and method of assessment differs between provinces and is greatly dependent on the involvement of an NGO. In the case of Ezemvelo Kwa-Zulu Natal Wildlife which has 42 formally declared private PAs, of which 18 Nature Reserves have conducted a METT assessment (several have done multiple assessments), an NGO coordinates and funds all assessments with no involvement from the provincial authorities (Practitioner). No assessment is undertaken without the assistance of the NGO (Practitioner).

In comparison, for private PAs in Limpopo and Mpumalanga provinces, especially those within the Greater Kruger region, there appears to be no standardised method of implementation. Either the head warden or managers are responsible for the implementation of METT while "SANParks oversees the process and provides input, assistance and guidance" (Warden I); or Kruger to Canyons (K2C) (as a division of SANParks PA Programme) and Game Rangers Association of Africa (GRAA) act as the consultant during the initial implementation of METT (Coordinator I;

Warden II). Kruger to Canyons is responsible for coordinating cooperation between the two provincial authorities (Limpopo Environmental: Economic Development, Environment and Tourism (LEDET) and Mpumalanga Tourism and Parks Agency (MTPA)) and SANParks for the purpose of a GEF funded PA expansion project. Provincial environmental officials do not appear to be involved during the implementation of METT (Warden I). Although it is difficult to gauge how exactly the METT has been implemented across the two provinces because of each private PA having a different management hierarchy, executive committees, or landowner involvement, it is clear that no two private PAs follow the same format.

Furthermore, the Game Rangers Association of Africa (GRAA), in cooperation with DEFF, is proposing to release an online METT platform that is believed will result in increased access and use (GRAA 2019). While the platform is already "live", its use has been restricted to DEFF and provincial biodiversity stewardship personnel for "security reasons" (Coordinator II). The online platform will also include the pressure and threats assessment and will be updated alongside each subsequent METT assessment (Practitioner 1). Nation-wide training is also said to be required before its official release (Coordinator I). In the Eastern Cape, where the Eastern Cape Parks and Tourism Agency is the main body responsible for the implementation of METT within private PAs, staff will assist "as required", with the support of NGOs (Provincial officer I).

In determining whether feedback is provided after completing the assessment, or any consequence if the evaluation identifies gaps or weak points, an inconsistency was found between the private PA wardens/managers and practitioners. The majority of private PA wardens/managers indicated that nothing has happened, that the METT was used and "never referred to again" (Manager; Warden I; Warden II), emphasising that the "effort required does not justify the outcome i.e. no feedback or consequence" (Warden I), while other wardens/managers suggested

otherwise (Warden III). In contrast, all the practitioners indicated that support is offered to the landowner to improve management, an effort is made to "address the gaps in…management" and interventions are included and prioritised in the APO (Practitioner). The discrepancy between private PAs experiencing different levels of follow-up could be explained by the number of assessments they have undertaken and its management hierarchy. Only the private PA which has undergone several assessments was able to confirm a change in management.

In addition to a general lack of feedback regarding the METT scores, it was also discovered that no system is in place to collect information about the challenges each private PA faced during its implementation. The lack of such information prevents future improvements from being introduced.

4.1.4. Supervising of scores

Of concern is the general lack of priority being placed on auditing scores, which is either infrequent or non-existent (Coordinator I; Warden III). This is despite one respondent indicating that a "subjective scoring system using exact percentages is troubling" (Manager). One respondent assumed that SANParks and DEA conduct screening (Warden I; Warden II). In KwaZulu-Natal, the provincial department has either not "provided any capacity or support for this function" thereby leaving the responsibility with the landowner/manager (Practitioner). Within the Greater Kruger region, scores are only "sometimes" screened because the focus of the assessment is not about the "score but rather the remedial actions" (Coordinator I). One respondent placed great emphasis on the lack of feedback/consequence regarding the scores (Warden I).

It appears that with the release of the online METT platform, GRAA will be the main body responsible for monitoring METT scores (Manager). However, there is doubt as to their adequacy since they are not an auditing firm but rather an NGO whose main objective is "to support and train rangers

in carrying out their responsibilities of maintaining the integrity of the area in which they work" (GRAA 2019; Manager).

4.1.5. Opinions regarding METT

The majority of respondents considered PAME in general to be beneficial for biodiversity conservation "as a baseline monitoring tool" (Warden III), to "provide an indication of how well strategic management plans and operational activities are being implemented" while identifying gaps (Practitioner; Provincial officer I). However, a few respondents did admit that PAME in general did not always being as beneficial in private PAs as in state-owned PAs (Warden III), or rather only beneficial "under certain parameters", such as when linked to funded projects (i.e. GEF) (Warden III) to act as a guide for management planning and budgeting (Warden I). Furthermore, it was also emphasised that METT should be used as a supplementary tool within a broader PAME system (management plans; implementation plans; M&E structures; work plans) (Coordinator I), such as in the Eastern Cape where it will be used to complement a State of Reserve Assessment to determine how the objectives are implemented (Provincial officer I).

The value of METT within private PAs varied between practitioners and private PA wardens/managers – from highly positive, "powerful if used correctly" (Coordinator I), the "best tool available" but requiring some adjustments (Provincial officer I), to increased doubts about its application, emphasising the need to use it as a long-term method to be repeated less (or in one case more) frequently (Manager; Warden I; Warden II). One of the respondents who considered METT to be highly effective mentioned that although "…some people feel that the METT assessment only works for state-owned PAs…all questions are very pertinent for private PAs (Practitioner).

Those that considered METT unsuitable and "too laborious", argued that self-implementation is unsuitable due to the high level of bias and subjectivity involved (Provincial officer II; Warden I). Of great concern is the indication that METT is merely seen as a paper exercise to meet reporting obligations "because of managements' habit of actively avoiding 'office time'" (Warden I). The standardised average against which scores are measured was also considered illogical due to the large disparity in private PA size, objectives, and management structure (Warden I). If a private PA's objectives do not align with those assessed in METT, it would result in lower scores and prevent comparisons (Warden I). The respondent suggested that if it were tailored specifically to each private PA, it might have greater value. Those who were not fully supportive of METT considered the separate pressure and threats assessment that accompanies the METT to be the most advantageous aspect as it "makes you apply your mind and analyse things i.e. see the matrix of management issues" (Warden I). However, this view is incomplete as this separate assessment was not completed within all METT assessments.

CapeNature was also under the impression that "…a full METT assessment on the majority of private PAs is an overkill…" due to them being small in size and not having the same staff and resource capacity as national or provincial PAs (Provincial officer II). Furthermore, because "…in most cases conservation is not the landowner's primary activity… management of the PA would not be their main priority" (Provincial officer II).

The need for staff competency evaluations was also highlighted by several respondents (Manager; Warden I). Without ensuring adequate staff who understand the intricacies of biodiversity conservation and PA management, a PA will never be effectively managed, as a "PA is only as good as its staff" (Manager). As elaborated by one respondent "the profile of reserve

managers is not conducive to the implementation of METT or similar, [as there is] no minimum entry-level requirements for managers" and most are of practical nature (Warden I).

4.1.6. Challenges of the current METT version

Whilst the challenges faced varied amongst respondents, "the interpretation of the questions and the thorough understanding of the tool's goal" (Coordinator I; Provincial officer I; Coordinator I) appeared to be the most common theme. Questions were said to require reformatting to increase understanding and avoid potential confusion (Provincial officer I). It was also suggested that METT should be changed to better align with management plans including increasing its flexibility to allow application within different PA types (i.e. Protected Environments) (Coordinator I). Extremely poor record-keeping and paperwork within private PAs was mentioned as preventing assessments from meeting the "evidence and supporting documentation" requirements of METT (Practitioner). Without evidence, because of subjective scoring, the assessment raised concern by a handful of private PA managers as needing "updating and consideration" (Warden II, III). "Defined roles and responsibilities" presumably between practitioners and provincial authorities were mentioned, including "buy-in from private PAs" posing additional challenges (Coordinator I).

The structure of a private PA also appeared to pose its own set of challenges, as in the Greater Kruger region several sites conform to a "federal system where every share block and farm operates independent[ly]" (Warden II). This challenge ties back into the misalignment between the private PA's objective(s) and what METT measures. With regard to this specific management structure, it was mentioned that despite being advised against it, the METT scores will be used as a "performance-evaluation by landowners and committees, etc. and managers will be wary of this" (Warden I).

Lastly, the "outcomes" section of METT is considered unrealistic due to the "large 'leaps' linking PA management to specific outcomes". Instead, a more realistic and shorter timeframe is suggested (Practitioner). To date, only 'internal reviews' and biodiversity assessments have been undertaken to find links between management inputs and conservation outcomes (Warden I, Warden III).

4.2. Quantitative Results

First, the results from the MTRA workshop is described and interpreted, including the related questionnaire, after which the MTRA output is compared with that of the METT-SA 3a.

4.2.1. MTRA Workshop

Site details: The name and details of the reserve have been deliberately excluded as per a Confidentiality Agreement with the researcher and the reserve. For context, the site can be described as community reserve less than 10 000ha in size, comprising both natural areas and those earmarked for tourism, and contains private and commercial lodges.

A four-year time frame was used for the site and a total of eight direct threats were identified by the participant. Although it is not "best-practice" to only having one participant applying the tool, it conformed to that of the site's 2018 METT assessment.

The results of the workshop, including the TRA calculations and list of identified threats, are provided below (Table 2). The eight threats were standardised according to the IUCN-CMP list provided and ranked according to *Area*, *Intensity*, and *Urgency* (see Table 3). The threats were defined and a definition for a 100% reduction was decided on.

Threats to the private PA decreased by 8.1% from 2016 to 2020 (Table 2), reflecting the mitigation of three of the eight identified threats. Despite a reduction in hippo numbers (25%), it still presents one of the top three threats. Furthermore, while the threat of development and elephant pressure

appears to have remained the same since 2016, both contributed the most to the overall assessment of threats. Using the supporting documentation provided during the workshop, the eight threats were investigated, with special attention paid to the five threats which showed no improvement with mitigation.

Table 3 - Threat Reduction Assessment Index of participating private PA

No.	Threat	IUCN threat code	Criteria Rankings (relative)			Total Ranking	% Threat Mitigated	Raw Score
			Area	Intensity	Urgency			
1	Tourism & recreation areas (Development)	1.3	8	8	8	24	0	0
2	Problematic native species/diseases (Elephant pressure)	8.2	6	7	7	20	0	0
3	Problematic native species/diseases (Hippo number)	8.2	5	6	6	17	+25	4.25
4	Recreational activities (Open Safari Vehicles)	6.1	7	3	4	14	0	0
5	Domestic & urban wastewater (Polluted streams entering)	9.1	4	5	5	14	0	0
6	Invasive non-native/alien species/diseases (Alien invasive plants)	8.1	3	4	3	10	+25	2.5
7	Utility & service lines (Overhead power lines)	4.2	1	2	2	5	0	0
8	Other ecosystem modifications (Redundant dams)	7.3	2	1	1	4	+50	2
		TOTAL	**36**	**36**	**36**	**108**		**8.75**
						TRA INDEX (%)		**8.10**

1. Development: the development footprint said to remain unchanged in the future and thus it is believed that the threat will not increase. However, the full threat of tourism activities has not fully been accounted for, not the disturbance of infrastructural maintenance;

2. Elephant numbers: because the site is an open system, there is no direct control on elephant numbers, however by decreasing the number of water sources (i.e. dams), it is postulated that the threat will decrease or at least remain stable. The threat is recognised with a decrease

in the number of knob thorn, marula, and vulture-nesting trees which has transformed the habitat from a closed woodland to an open woodland savanna.

3. Hippo numbers: similar to elephants, the site cannot directly control hippo numbers, however, it is recognised that hippo numbers are artificially sustained by artificial dams and consequently compete directly with the white rhino population in the area. The demolition of an additional dam is postulated to decrease this competition and decrease the threat hippos pose. The threat hippos pose to other wildlife, vegetation and water quality was not recognised.

4. Open Safari Vehicles (OSVs): guidelines for the use of OSVs on the property is included in the purchasing contract and is believed will not change. However, additional threats such as CO_2 release and a transport mechanism for alien plant seed dispersal is recognised. The threat of continual traversing has not been accounted for (i.e. roads requiring maintenance, roadkill, light pollution, etc.);

5. Polluted streams entering: this threat cannot be mitigated at the local level except to continue engaging with other management agencies. There is thus the potential for this threat to increase;

6. Alien invasive plants: there is a dedicated invasive alien control program that is used to contain its spread. This threat will never be completely mitigated due to e.g. the river acting as a means of transport;

7. Overhead powerlines: existing powerlines will not change. However, the threat posed during their maintenance was not acknowledged or whether vegetation has been cleared underneath them.

8. Dams: another dam has been earmarked for rehabilitation, however, the largest one is used by adjacent farms and will not be demolished. The demolishment of another dam is believed to increase the mitigation value and decrease its overall threat score

1.2.1.1 Participant Questionnaire

The participant recognised the value of MTRA in terms of quantifying threats, although added that the threats were already known and documented but that "real progress to mitigate was prevented by institutional challenges and complexities". The participant believed the MTRA could be used as a standalone tool, however, it does not address the "human and institutional dimension" which is considered the most important aspect for that particular private PA to "move forward with [the] development". Moreover, the MTRA is not considered representative of "all the PA threats encountered in conservation systems in Africa". Therefore, despite both tools serving its own purpose and the ability of MTRA to "quantify and rank threats objectively which is important for motivational purposes", the METT is better suited for the needs of that particular private PA.

4.2.2. Comparing the MTRA with the METT-SA 3a

For a more comprehensive comparison between the two tools, both advantages and disadvantages of either tool was investigated, including the difference between the MTRA and the pressure and threats assessment included with METT-SA 3a.

4.2.2.1. Advantages of the MTRA

The advantages of the MTRA was investigated by determining its position among the indicators chosen for the METT-SA 3a. This would allow one to deduce whether it could be used as a stand-alone tool and/or whether it could strengthen the value of the METT-SA 3a.

Analysis of the total METT-SA 3a scores reveals a management effectiveness mean score of 54.30%, indicating inadequate management due to significant gaps (Figure 3). The management spheres which scored "sound management" were: (1) organisational structure and procedures; (2) financial management; and (3) operational equipment and infrastructure.

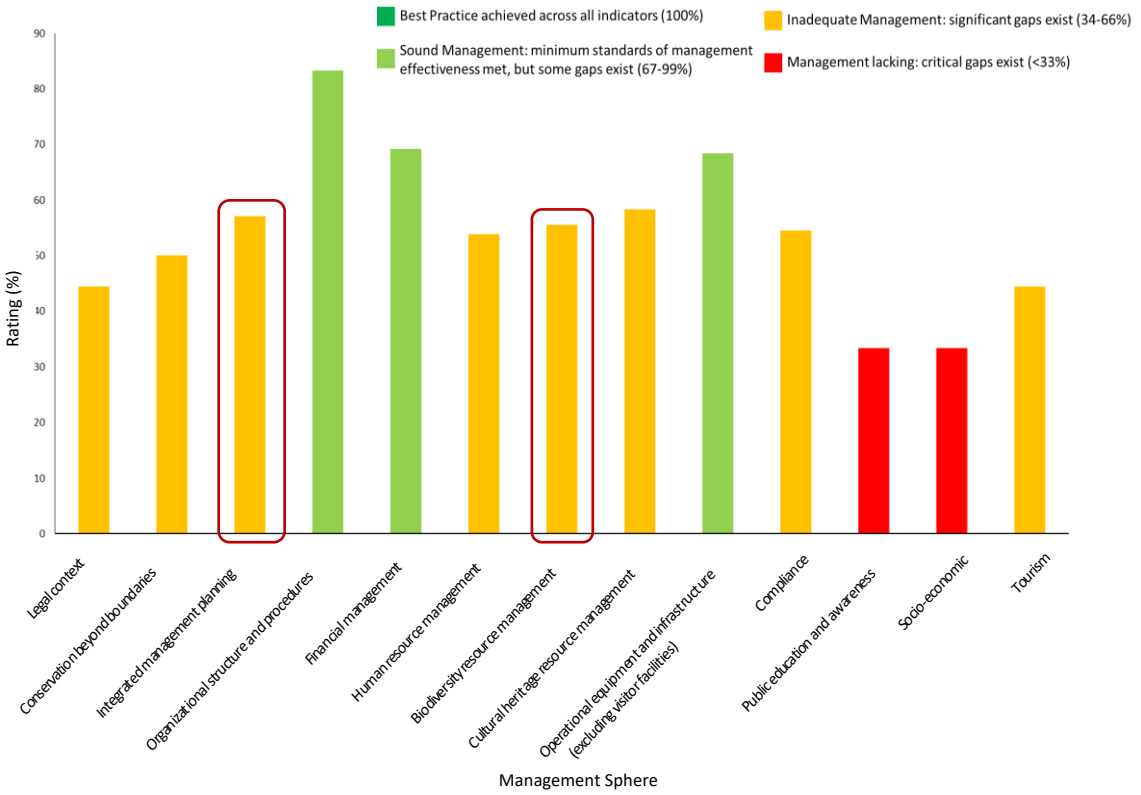

Figure 3 - METT-SA 3a 2018 results from participating PPA (adapted from original document)

In determining the value of MTRA, the indicators first investigated were those considered relevant to the top five threats identified by the TRA calculations, including the three threats that had changed during the course of the chosen time period (development, elephant numbers, hippo numbers, redundant dams and alien invasive plants). It was then determined to which indicators those were connected to in the METT tool, resulting in a total of ten indicators across two management spheres - "Biodiversity Resource Management" and "Integrated Management

Planning ” (Appendix F) for which the participant scored 55.56% and 57.14% respectively, indicating inadequate management due to significant gaps.

Of the indicators used from the two management spheres (Appendix F), “Risk Assessment” (Q 1.6) was considered the most pertinent for this study and for which the participant scored 0/1. Without acknowledging pressure and threats, as measured by a risk assessment, mitigation actions cannot be identified and implemented. Consequently, introducing the MTRA provides a necessary step, in which threats are not only identified but also monitored and ranked. The importance of such an assessment is illustrated (red circle) in the assessment organogram below (Figure 4).

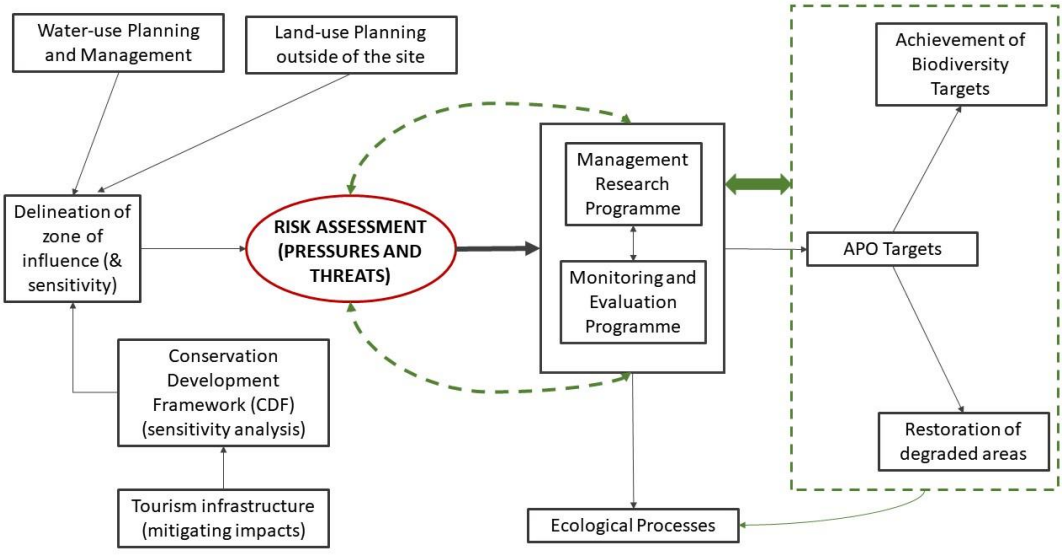

Figure 4 - Organogram to illustrate the interconnectedness of a risk (pressures and threats) assessment

In the absence of a risk assessment, the management plan, for which the participant scored 1/3 (Q 2.2) is noncompliant with NEMPA Norms and Standards 11(1)(a)(iv), which requires “an analysis and strategy for addressing protected area threats and pressures”. Furthermore, because of an incomplete management plan several other indicators are affected, three of which deal with zonation on the property, another requirement under NEMPA (Figure 4). To delineate zones (Q 2.1.2), water-use and land-use planning on-site and in the immediate surroundings should be

considered (Q 6.5 and 6.6). This is of particular relevance for this participant as agricultural practices have been reported to occur along one of its borders. Similarly, a zoning system is considered, not only to demarcate sensitive areas in which disturbances should be kept at a minimum (Q 2.2.1), but threats within each zone will also be dependent on management activity in which possible trade-offs occur i.e. tourism activities (Q 5.1). As a result, depending on the size of the different zones, it is suggested to administer separate MTRA assessments per zone as it will allow management to focus resources on zones receiving the highest impact.

A further indication of an incomplete management plan is based on the participant scoring 1/3 for Annual Plan of Operations (APO) (Q 4.1) for not linking the APO to specific management plan targets. The MTRA could aid in setting APO targets based on the occurrence of threats. The restoration of degraded areas (Q 2.6) is also considered relevant to identified threats - until those areas are fully restored, they could potentially pose a threat to ecological services and should, therefore, be monitored.

Although the private PA in question has an established monitoring and evaluation programme (Q 3.1.1) with the use of a "bi-annual operational management audit", it is uncertain what baseline information was used to measure the level of achievement of objectives. Regardless, monitoring threat levels will strengthen the established monitoring and evaluation program. Similarly, monitoring threat levels will also aid in shaping the management research programme (Q 3.1) which, like the monitoring and evaluation programme, is required to determine the biodiversity target achievements (Q 6.2; scored 2/3) and the maintenance of ecological processes (Q 6.3; scored 1/3). As indicated in Figure 4, the risk assessment, management research programme, and monitoring and evaluation programme should occur within a continuous adaptive cycle to inform the subsequent APO targets.

4.2.2.2. Comparing the threat assessments

Although the participant did not complete the separate pressures and threats assessment (adapted from RAPPAM) that accompanies the METT-SA 3a, the assessment was still analysed to determine its strengths and weaknesses in comparison to MTRA.

MTRA is considered superior to the RAPPAM pressures and threats assessment by (1) providing a standardised threat list that has been developed by the IUCN, (2) ranking scores without treating them equally and allowing individual percentage allocations, and (3) determining the urgency of mitigation requirements instead of predicting a pressure or threat's permanence.

Table 4 - Comparison between the MTRA and the METT-SA 3a Pressures and Threats Assessment

DIFFERENCES	METT-SA 3A PRESSURES AND THREATS ASSESSMENT	MTRA
List of pressures/threats	Treated equally	Ranked
	List of only 23 Threats listed by the participant in the MTRA do not appear on this assessment	IUCN-CMP Lexicon of Threats provides an extensive list with three levels allowing a richer understanding of specific threats
Threat scores	A wide range between the different percentages given (i.e. 15-50%) or descriptive words (i.e. increased sharply/slightly; impact severe/mild)	Can provide richer content by setting own percentages
	Small changes in threat level will not be tracked	Can track small changes in threat level
	Having words describe impact or trend appears more subjective than awarding a percentage	
Mitigation score	Not available, only able to calculate a trend	Calculates the average percentage of mitigation success Gives you immediate value to determine whether you have mitigated (some) threats Using threat "Total Ranking" one can determine the top threats

Threat status	Permanence - enquires about system recovery if the pressure/threat is removed	Urgency – makes more sense to determine when a threat should be mitigated than determine how long it will take for a system to recover once the threat has been removed

4.2.2.3. Advantages of the METT-SA 3a

As indicated by the participant who used MTRA, the METT-SA 3a investigates more elements of the PA management cycle - a total of six elements including context, planning, inputs, processes, outputs and outcomes, with emphasis on context, planning, inputs and processes (Hockings *et al*. 2015). The inclusion of these elements provides a more comprehensive overview of the strengths and weaknesses of management in comparison to the MTRA which solely investigates threat mitigation and would not be able to indicate which management elements requires improvements. Furthermore, the inclusion of these elements allows a clearer overview of how the PA interacts within a larger SES, instead of an ecological island. This would allow a shift in focus from local to landscape management, a necessary step with the onset of climate change and increasing human-induced pressures on the borders of PAs. Thus, MTRA cannot replace the value of the METT-SA 3a, but rather strengthen it, particularly because the MTRA is considered more advantageous than the current pressure and threats assessment included in the METT-SA 3a.

5. Discussion

PAME has been recognised as a vital step in ensuring PAs meet their biodiversity conservation objectives. In South Africa, where 79% of the country is privately owned (De Vos and Cumming 2019), private PAs have become the most cost-effective tool for achieving PA expansion. While an adapted version of the METT (METT-SA 3a) has been introduced into a majority of its state-owned PAs, ten years since its initial introduction, very few private PAs have been evaluated, despite private PAs constituting 25% of the country's formal PA network (De Vos and Cummings 2019).

The motivation of this study was to analyse the PTD embedded in South Africa's Environmental Right to determine its link with MEEs; determine how each province differs in terms of the implementation strategy; gauge the perspectives of the different biodiversity stewardship practitioners and PPA managers involved in the implementation of METT-SA 3a, and to implement the MTRA within a PPA and compare it with the METT-SA 3a. In doing so, the main objective of determining whether the MTRA can act as a complementary or standalone tool could be investigated. The rationale was that if the MTRA provided a complementary tool for the annual management plan audit that is currently used in all biodiversity stewardships, it would considered be more beneficial for PPAs which do not have the necessary resources (staff, time and funds) to ensure the METT-SA 3a is implemented according to best practice guidelines.

The discussion has been divided according to the three objectives set at the beginning of the thesis.

5.1. Governance

5.1.1. PAME and the Public Trust Doctrine

The South African Constitution gives every citizen the Right to have the environment protected through measures which ensure ecologically sustainable development (Lubbe 2019).

Achieving sustainable development in a country striving for economic and social equality is however a challenge, as development inevitably places increasing pressure on its natural resources. Regardless, the government is bound by its fiduciary duty as trustee, to ensure that on behalf of current and future generations (as beneficiaries), its natural resources are not degraded. This is of particular relevance within private PAs as the government is obligated to prevent any individual from unsustainably exploiting the environment for private profit or exclusive benefit (Blackmore 2016).

The mere presence of the PTD is not enough to ensure decisions are made in favour of the environment, as seen with the continued loss of biodiversity. Section 24(b) of the Constitution also obligates the government to take reasonable legislative and *other measures* to protect the environment (Kotzé 2007; emphasis added). It can be argued that currently, the government does not have sufficient empirical data to guide its decisions on whether a proposed development will have long-lasting impacts on the environment, consequently undermining its trusteeship obligations. Either that or the government is misinterpreting legislation and thereby making a mistake, or deliberately disregarding its duties (Barendse *et al.* 2015).

While the establishment of PAs contributes to achieving the objectives stated in NEMPA, they remain subject to human-induced pressures such as recreational and consumption use of natural resources (Blackmore 2018b). This is especially prevalent in South African where ecotourism has formed a major part of the economy (Skowno *et al.* 2019). It is these pressures, individually or cumulatively, both inside and on the borders of PAs, that have a negative impact on the PA's integrity and the biodiversity therein (Blackmore 2018b). It is therefore important to ensure that decisions taken within PAs result in biodiversity protection alone, or risk undermining

the conservation agencies' ability to meet their trusteeship obligations (Blackmore 2018b). The duty of care is also established in NEMA Section 28(1 and 2) which imposes an obligation on:

> 'any person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution…from occurring, continuing or recurring'

Section 28(3) elaborates on the measures mentioned, including investigating, and evaluating the impact, modifying the activity that causes the impact and remedy its effects.

Moreover, as emphasised by Blackmore (2018b), the government, as custodian, is obligated to do more than just avoid significant threats by stopping short of species extinction, but rather by doing everything reasonably necessary to conserve and protect biodiversity. However, neither the beneficiary nor the State has mechanisms at hand to measure or demonstrate whether these obligations have been met, and it is recognised that the long-term effectiveness of the PTD can only be guaranteed if the beneficiaries of the trust are empowered to police the government's decisions (or indecisions). Therefore, in addition to providing the government with the opportunity to exercise its fiduciary duty of safeguarding biodiversity present in PAs, the introduction of MEE tools, whether intentional or not, have provided such a mechanism. Furthermore, the implementation of MEEs has the potential of expanding the knowledge required to promote and improve evidence-based decision-making. With the continued increase in threats, both within and on the borders of PAs, evidence-based decision making will become imperative to prevent the erosion of its ecological integrity (Blackmore 2018b).

While the link between MEEs and the PTD has been established, it will only be realised once the results of all MEEs are made public (as per NEMA Section 31(1 and 2)) and the use of MEE becomes mandated (according to NEMPA Section 43 (1 and 2)).

5.1.2. National Policy Framework

Although the biodiversity stewardship programme has been incredibly successful at facilitating PA expansion, it has not been matched with an equal political will or logistical support from the government (Barnes *et al.* 2017; Wright *et al.* 2018). Yet the strength of local institutions and supportive national policy frameworks have been found to be fundamental for effective PA management, particularly due to the impact of threats occurring on the borders of PAs (Barnes *et al.* 2017). Although collaboration within and between governmental departments and external stakeholders is fundamental for the long-term success of South Africa's biodiversity stewardship programme, the country's environmental governance structure is considered severely fragmented in addition to lacking enforcement and compliance mechanisms (Kotzé 2006). This is despite its progressive environmental laws in which co-operative environmental governance is firmly entrenched (Section 41, NEMA Chapter 3, 4, and 8). Fragmentation poses various disadvantages, of which unsustainable development is the most pertinent and in direct contravention of Section 24 of the Constitution.

The importance of intergovernmental collaboration was also emphasised in the UNDP project initiated in 2015 which aimed at improving management effectiveness in South Africa's PA network. Critical institutional and capacity development requirements were recognised as a priority that ought to be addressed at both national, agency, and PA levels (UNDP 2012). This included the need to harmonise the disparate approaches applied by the country's various PA management agencies. The primary need included the development of a country-wide management planning, monitoring, and evaluation system that was understood and implemented by all conservation agencies while ensuring best practice standards (UNDP 2012).

The provincial government authorities tasked with leading implementation of the biodiversity stewardship programme are known to be severely underfunded and short-staffed, and although NGOs have become more involved in providing much-needed support, they too are limited by short-term funding cycles (Wright *et al.* 2018). Similarly, with an increase in stakeholder involvement, so too has the priority to strengthen government-NGO partnerships and collaboration. Whilst a certain degree of clarity of roles and responsibilities exists, it requires further refinement, particularly as role differentiation, is considered crucial for enhancing collaboration and improving financial sustainability (Wright *et al.* 2018).

Without the established frameworks between the different stakeholders which are required to facilitate the implementation of METT-SA 3a, the success of the programme is at risk of being compromised. In South Africa, landowner satisfaction was found to be dependent on their interactions with an extension officer and perceived efficacy of the program (Selinske *et al*. 2015). Increasing the administrative work of the extension officers without ensuring a similar increase in additional funds required for more staff, will inevitably compromise landowner satisfaction, and decrease the potential of them extending their PA declaration status (see Table 2). Of similar importance is the role of extension officers in monitoring managements' compliance with approved management plans and land-use restrictions (Shumba *et al.* 2020). Likewise, if extension officers were to become inundated with facilitating the implementation of PAME tools and providing support when the tool indicates weaknesses in management, the lack of compliance monitoring could result in increased habitat degradation on private PAs. Either scenario emphases the need to first ensure enough funds are available to employ more extension officers before any additional administrative tasks are developed.

Other considerations include the need to ensure the private PA database is up to date and contains information on when they were established, what they are managed for and by whom, to enable widespread evaluation of their contribution to biodiversity conservation (Shumba *et al.* 2020). Affiliated to this is the need to locate all the private PAs which were established under the old Nature Conservation Ordinance and thus requires verification and validation to ensure they are brought up to standard and compliant with NEMPA. Once the database is up to standard, satellite imagery analysis can be used to determine losses in land cover and biodiversity intactness as a proxy of management effectiveness at the local scale. These analyses will prove invaluable alongside MEEs.

5.2. METT and its use in South Africa

Ten years since South Africa undertook the nationwide implementation of METT in state-owned PAs and the subsequent improvements to the tool, no similar program has been launched to ensure all private PAs undergo MEEs other than those which have been assessed on an *ad hoc* basis. Vast differences between the provinces in terms of support offered and implementation strategy exist, with KZN appearing to be the lead province with a dedicated NGO steering the implementation. The Western Cape province, where the biodiversity stewardship program was launched, has not prioritised the implementation of METT-SA 3a but rather relies heavily on the annual management plan audit to ensure effective management. The variation in the frequency of implementation between the different private PAs is also of concern, especially for those situated in the Greater Kruger and therefore part of a larger PA network. Although all reported that the tool was meant to be implemented annually, this rarely appeared to be the case. A lack of resources including permanent skilled staff, time, and finances was said to be the greatest hurdle. Staff capacity, defined as the technical ability of staff to perform management activities was also

recognised as a key driver of effectiveness (Barnes *et al.* 2017). An emphasised by one of the participants, PA management is only as good as your staff. This could be applied to both PA staff and biodiversity extension officers.

In determining the perspectives of the stakeholders directly involved in the implementation of the METT-SA 3a, a difference with regards to its perceived benefits were found between managers and practitioners. All participants considered PAME to be beneficial for biodiversity conservation, however, when asked specifically about the benefits of METT-SA 3a, all but one of the biodiversity stewardship practitioners were extremely supportive and considered it beneficial, while the wardens or managers were not completely convinced. Although some recognised that with improvements and less frequent use it could be beneficial, others considered the challenges faced during its implementation and the amount of effort it required, outweighed any perceived benefits. The general lack of feedback regarding the assessment scores and support offered to improve the identified gaps could explain the different views, including a lack of requested feedback regarding any challenges faced during its implementation. Without the full support of those responsible for its implementation, the METT-SA 3a will not provide its intended benefits, including the possibility of creating a false sense of effective management, thereby allowing threats to persist.

The biodiversity stewardship officer who was not in agreement about its benefits emphasised that although some private PAs had implemented it, it was not a priority for the environmental agency as not only did they lack the capacity to implement it but they were instead focused on using the annual management plan audit to ensure the PAs were managed accordingly. The audit entails a meeting with the landowner/manager where achievements against the APO are discussed, after which a new APO is drawn-up in which management activities are prioritised

according to funding and resources available. Responsivities between landowner/manager and the provincial authorities are also agreed upon.

The challenges faced by both groups of stakeholders during the implementation of METT-SA 3a were plentiful, but the interpretation of the questions and understanding the tool's goal was a common theme. After analysing the other challenges, it appears that overall, the tool has not been modified to align with the complexities of private PAs in terms of objectives, size, and complex management structures, despite the UNDP project emphasising the need for a more user-friendly tool (UNDP 2012). These challenges not only prevent accurate data from being gathered, thereby wasting resources during the implementation of the tool, but also results in the users forming a negative connotation with the tool. When assessments are not carefully considered by management and do not lead to improved management on the ground, there can be increasing resistance to the effort required in conducting the assessments (UNDP 2012). This could explain why some wardens or managers did not consider the tool beneficial. With numerous studies showing landowner satisfaction as an important factor for ensuring biodiversity stewardship success, preventing negative associations with PAME tools should be prioritised (Selinske *et al*. 2019; Wright *et al*. 2018). The reported lack of record-keeping on private PAs is of similar concern, as not only does this prevent a thorough investigation into which indicators in the METT-SA 3a have been met, but also prevents comparative analysis required for adaptive management. This coincides with one warden mentioning that the majority of those working in managerial positions actively avoided office time and only saw METT-SA 3a as a paper exercise to meet reporting obligations. Similar to extension staff, this could allude to the need for ensuring PA management staff and sufficiently trained for the tasks at hand. Regardless, unless this mindset is addressed, regardless of the improvements to the METT-SA 3a or the use of a different tool, the results cannot

be considered credible or robust. This is of concern as the METT-SA 3a relies solely on qualitative data and therefore subject to interpretative bias and subjectivity (Carbutt and Goodman 2013). The user needs to understand the importance of ensuring that the tool is implemented according to the guidelines provided. Preferably, as suggested by Carbutt and Goodman (2013), standard operating procedures (SOPs) should replace the guidelines as a non-negotiable prerequisite.

5.3. The value of the MTRA

Overall, as expected, the MTRA facilitated a better understanding of the different threats identified within the private PA (Table 3). While there was some overlap in the types of threats identified, the MTRA identified five which were not apparent in the 2018 METT-SA 3a results, namely elephant and hippo numbers, overhead power lines, polluted streams entering and redundant dams. There was mention of the river running through the site and that upstream abstraction was being monitored, but pollution was not mentioned specifically. The three threats that were mentioned in the METT-SA 3a (development, open safari vehicles and alien invasive plants (Appendix H), were not specifically referred to as threats but rather elements that required improvements and inclusion within the management plan. This could be explained by the fact that the site had not completed its risk assessment, as required but both the N&S and the METT-SA 3a.

The decrease in threats between 2016-2020 as indicated by the TRA Index (Table 3) is attributed to a reduction in alien invasive plants and the number of dams on the site, which in turn decreased the number of hippos that were attracted and remained on the site. Using the 2018 METT-SA 3a score, only a bio-control program for an invasive weed and “alien plant removal targets achieved” was mentioned, however, the presence of a well-established alien invasive program, can explain the low ranking (fifth) of the threat. Of concern is the lack of recognition in

the 2018 METT-SA 3a results for the threats posed by development and an increase in elephant and hippo numbers. These threats will be discussed in detail below.

There appears to be a general disregard for the threats posed by development as the most relevant indicator included within the METT-SA 3a pertains to whether the tourism infrastructure mitigates 'visitor impacts as informed by the sensitivity and value of the PA'. It is considered necessary to investigate the actual infrastructural footprint (buildings and paths) of all private PAs (and state-owned PAs) to determine how much natural vegetation had been removed and what the impact of future maintenance would be. This is supported by 'development' ranked the highest threat in the MTRA and 'open safari vehicles' ranked fourth. By not recognising the range of threats caused by development, ultimately disregards their cumulative impacts on the long-term conservation success of PAs (i.e. local fragmentation and removal of habitat which would be rare or endangered). Similarly, the threat of soil compaction and roadkill is also not explicitly mentioned, only that the number of game vehicles could have an impact on game-drive roads.

The need for these threats to be recognised is further supported by the fact that private PAs are solely reliant on revenue generated either through ecotourism or hunting. Not only has a strong link been found between visitation and invasion by alien and pest species, but there appears to be a major conflict of interest and a critical trade-off between visitor- and biodiversity management (Barnes *et al.* 2017; Shumba *et al.* 2020). It is acknowledged that high visitation can increase the management budget and motivation for effective protection, but it can also result in habitat degradation, increased human-wildlife conflict and increased operating and management budgets, to name a few. It is therefore unclear whether the positive benefits of revenue outweigh the negative impacts of ecotourism, especially with evidence pointing to visitation being a strong driver of species outcomes (i.e. the iconic 'Big Five' in South Africa) (Barnes *et al.* 2017). With

ecotourism being the fastest growing tourism sector globally (Barnes *et al.* 2017), its associated threats will have to be recognised, monitored, and managed accordingly.

The threat caused by a growing elephant population is mentioned and ranked second in the MTRA, and although the population size cannot be controlled by management as the private PA and mentioned in the assessment, several mitigation methods can be applied to reduce the degree of the threat. These include wire-netting or beehives hung strategically between tree species (Cook *et al*. 2018). Similarly, the threat posed by hippos ranked third in the MTRA, can potentially be controlled with the use of mitigation methods such as dam closers, decreasing the amount of water stored in the remaining dams and fencing off sensitive vegetation.

Knowing which parts of the PA is the most vulnerable to disturbance is important not only for future development but also for mitigating damage caused by wildlife. This highlights the importance of a sensitivity analysis or a zone of influence, two indicators included in the METT-SA 3a (Appendix H).

6. Conclusion

This thesis set out to determine to what degree the MTRA tool can be used to evaluate management effectiveness within private PAs in South Africa. First, the country's environmental law and the government's fiduciary duty to ensure the environment is protected for the benefit of current and future generations (beneficiaries) was investigated to determine its link to MEEs. This was followed by deploying questionnaires to investigate the current challenges associated with the implementation of the METT-SA 3a, with a specific focus on two stakeholder groups: private PA wardens or managers, and biodiversity stewardship practitioners. The identified challenges were used to deduce the feasibility of the MTRA as either a standalone or complementary tool. The feasibility was further tested by implementing the MTRA within a private PA which had already undergone one METT-SA 3a evaluation. Using these scores and the ones obtained from the MTRA, an analysis was conducted to determine: how the MTRA complemented the METT-SA 3a; the advantages of both tools; and how the threats identified in the MTRA compared to the weaknesses identified in the METT-SA 3a scores.

This study was motivated by the fact that although private PAs constitute 25% of South Africa's PA network, thereby protecting endangered and rare habitat types and forming important buffers and corridors to support state-owned PAs, their effectiveness remains unknown. Because these private PAs contain underrepresented and threatened ecosystem types (De Vos *et al.* 2019), it is imperative that they are equally well managed to ensure its integrity remains intact.

The urgent need for private PAs to be evaluated is further emphasised due to the existence of ecotourism ventures (Barnes *et al.* 2017). Because private PAs rely solely on ecotourism and hunting to generate revenue, there is the risk that managers may manage according to powerful market incentives instead of employing a whole-systems approach (Barnes *et al.* 2017). This is

already a common occurrence in South Africa, with many private PAs focused on managing for the 'big five'. This highlights the complexities of achieving conservation success in landscapes where financial viability is both a driver of wildlife-based incentives and a potential constraint on their effectiveness at conserving biodiversity. It is because of this that the PTD is going to have to play a vital role in ensuring sustainable development and biodiversity conservation is not compromised for the benefit of landowners and a select few.

The rationale behind comparing the MTRA with that of the METT-SA 3a was largely due to provincial biodiversity stewardship departments being severely understaffed and underfunded and thereby not equipped to provide the private PAs with the adequate support needed not only to ensure that the METT-SA 3a is implemented according to best practice guidelines but also to provide support after the assessment had been completed and had identified management weaknesses.

Taking into consideration the management organogram (Figure 4), the feedback obtained from the two different stakeholder groups, and the capacity limitations present within all provincial biodiversity stewardship departments, the MTRA is considered both a better alternative tool to use within private PAs which do not have the necessary resources to ensure the METT-SA 3a is implemented according to best practice guidelines, and capable of acting as a standalone tool.

Due to the vast variation in private PA objectives and management structures, implementing a tool that solely focuses on identifying threats without creating administrative challenges, would produce an environment where the tool's benefits for management are recognised, instead of a "paper exercise" as currently observed. Further support for the MTRA is based on its potential to be included in the established annual management plan audit conducted by all provincial biodiversity stewardship departments. The MTRA provides both a key link between different

management components while also facilitating an adaptive management cycle. Furthermore, ranking threats according to prevalence allows management to direct limited resources to the most important areas. Similar to the METT-SA 3a, ensuring best practice guidelines are followed during the implementation of the MTRA is crucial to ensure validity of the outcomes. It would therefore be necessary to ensure that all managers and practitioners utilising the tool, understand the reasoning behind the guidelines.

Further argument is centred around the need to first establish an inclusive framework to streamline the implementation of METT-SA 3a. This framework should include (1) a platform to provide constructive feedback regarding the tool, challenges faced, and the steps required to prioritise the gaps identified during the assessment, and (2) an established social network among the private PA managers or wardens and biodiversity stewardship practitioners to facilitate idea sharing and collective learning. A network will compensate for most provincial departments being understaffed and thereby prevent a decrease in landowner satisfaction while also allowing important information to be gathered which in turn should be used to improve the tool. However, a general lack of coordination in management objectives and resource sharing has been found within the private conservation network in the Western Cape province (Maciejewski *et al*. 2016). Therefore, unless this coordination is facilitated by the different provincial biodiversity stewardship departments, all of whom are understaffed and underfunded, it remains a novel idea. Furthermore, the lack of extension officers is not only limited by funding but also the type of skills required for the type of roles they have to fill. The need for skilled personnel extends to the management of private PAs, as previously emphasised. Without ensuring adequately trained managers to firstly understand the role of MEEs and then facilitate its implementation, a PAME tool will not provide its intended benefit, regardless of ease of use. Consequently, in the case of

private PAs where the government has no jurisdiction in ensuring staff is adequately trained, a straightforward tool is considered more beneficial to gather baseline data and strengthen the annual management plan audit than a tool that increases administrative tasks and challenges.

Although the METT-SA 3a includes the RAPPAM adapted pressure and threats assessment, it does not provide equal benefits as the MTRA (Table 3). As such, because the tools are equal in the amount of user-effort required, it is suggested that for the private PAs who are able to benefit from the METT-SA 3a, the MTRA should replace the accompanying pressure and threats assessment

Whilst effectiveness is difficult to quantify, the need to understand what conservation strategies works, how and why has become imperative. Although the MTRA does not investigate the different interactions affecting the management effectiveness of a PA within a larger socio-ecological system as METT aims to do, by identifying a wide range of threats which are bound to have a direct impact on the management effectiveness of a private PA, one can at least identify the local actors causing those threats. Furthermore, since all private PA undergo annual management plan audits, the MTRA is considered a complementary tool to strengthen the adaptive management focus of the audit. By implementing the MTRA and analysing the results, management will automatically know where resources should be spent and how successful previously management practices have been at mitigating identified threats. If the threats were not mitigated, one can deduce that either the management practice was insufficient, or other elements are at play, or both.

6.1. Suggestions for future research

Considering the scope of the study and the limitations that were encountered, there are several recommendations for future application of the MTRA tool and research regarding its implementation within private PAs.

It is important to anticipate reluctance from the potential participants and plan accordingly. As previously mentioned, managers actively avoid paperwork so a large study group should be targeted to ensure more than one participant agrees to participate.

Since South Africa has no immediate intention to implement the METT-SA 3a or any other PAME within private PAs on a country-wide scale, there is the potential of testing the feasibility of the MTRA within a larger sample group. In doing so could introduce the value of the tool to more private PA managers. The study could also be supplemented with a land cover and biodiversity intactness analysis determine the complementary of the data. It would also be beneficial to interview government officials to determine their view on METT-SA 3a and the existence of the PTD.

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8. Appendices

Appendix A - Different conservation types (PACA, DEA 2020)

CATEGORY	DESIGNATION TYPE		DESIGNATION SUB-TYPE	
Protected Area	1.	National Park	1.1	National Park
			1.2	NP Wilderness Area
			1.3	Not assigned
			1.4	Contractual Park
	2.	Nature Reserve	2.1	Provincial Nature Reserve/Nature Reserve
			2.2	Private Nature Reserve
			2.3	Nature Reserve (Stewardship programme)
			2.4	NR Wilderness Area
			2.5	Bird Sanctuary
			2.6	Development Area Reserve
			2.7	Not assigned
	3.	Special Nature Reserve	3.1	Special Nature Reserve
			3.2	Not assigned
	4.	Mountain Catchment Area	4.1	Mountain Catchment Area
			4.2	Not assigned
	5.	World Heritage Site	5.1	Core
			5.2	Buffer
			5.3	Not assigned
	6.	Protected Environment	6.1	Protected Environment
			6.2	Protected Environment (Stewardship programme)
			6.3	Protected Environment (Other)
	7.	Forest Nature Reserve	7.1	Forest Nature Reserve
	8.	Forest Wilderness Area	8.1	Forest Wilderness Area
	9.	Specially Protected Forest Area	9.1	Specially Protected Forest Area
	10.	Marine Protected Area	10.1	Marine Protected Area
			10.2	Not assigned

CATEGORY	DESIGNATION TYPE		DESIGNATION SUB-TYPE	
Conservation Area	1.	Biosphere Reserve	1.1	Core area
			1.2	Buffer zone
			1.3	Transition area
			1.4	Not assigned
	2.	Ramsar site	2.1	Marine/Coastal Wetlands
			2.2	Inland Wetlands
			2.3	Human-made Wetlands
			2.4	Not assigned
	3.		3.1	Biodiversity Agreement

		Stewardship Agreements other than Nature Reserves and Protected Environments	3.2	Voluntary Conservation Area
	4.	Botanical Garden	4.1	Botanical Garden
			4.2	Wild Flower Reserve
	5.	Transfrontier Conservation Area (Currently Outside Database)	5.1	Transfrontier Conservation Area
	6.	Transfrontier Park (Currently Outside Database)	6.1	Transfrontier Park
	7.	Military Conservation Area (Multi-use conservation areas)	7.1	Military Conservation Area
	8.	Conservancy	8.1	Conservancy
	9.	Specially Protected Forest Area	9.1	Specially Protected Forest Area

Appendix B – MTRA Workshop-Adapted Package

1. MTRA Information Sheet

What is a Modified Threat Reduction Assessment (MTRA)?

All biodiversity in protected areas (PA) face threats. The MTRA monitors these threats as a proxy measurement of management effectiveness. It originates from the Threat Reduction Assessment (TRA) developed by Salafsky and Margoluis (1999) and later modified by my supervisor, Brandon Anthony, to include worsening or emerging threats (Anthony 2008). The MTRA relies on the knowledge and expertise of the management staff who know the protected area the best.

The MTRA ranks identified threats based on specific criteria and assesses their change across time. The key principle of MTRA is that the reduction of identified threats is considered a management success, and vice-versa.

The MTRA is considered quick, low-cost and useful when no baseline studies on biodiversity threats are available. Furthermore, it allows for comparison across sites and institutions due to the standardization of identified threats using the IUCN Standard Lexicon of Threats classification.

When thinking about the biodiversity threats, it is important to keep in mind the three components that constitute biodiversity:

1. Species present;
2. Habitat condition and the area;
3. Ecosystem functions.

The MTRA approach is based on three key assumptions:

1. **All threats to biodiversity are human-induced.** Loss of biodiversity or habitat caused by natural phenomena is not considered a threat (e.g. fires cause by lightning). However, natural threats that have increased in frequency or intensity as a result of human activities, may be included.
2. **All threats to biodiversity can be identified.** Management staff is able to identify, classify and rank all the threats, based on their (1) impact, (2) intensity and (3) urgency in the area.
3. **It is possible to measure or estimate the changes of these threats.** Experts and managers have the ability to determine the percentage of change over a defined period of time.

I will be using this tool to not only measure the changes in biodiversity threats, but my main focus is to compare the results with those scores calculated in another Management Effectiveness Evaluation (MEE) tool, called the Management Effectiveness Evaluation Tool (METT). This tool has been adapted to a South African context and consequently known as the METT-SA Version 3. Because South Africa is heavily reliant on private PAs to increase its total PA estate, ensuring these areas are equally well-managed is vital to ensure the country's PA network is resilient against the impacts of climate change and continued habitat destruction. Currently, very few private PAs are undergoing MEEs, as such the METT-SA Version has not been adapted with private reserve management and conservation objectives in mind. I am hoping that this study will shine light on its appropriateness to private PAs and whether a simpler tool, the Modified Threat Reduction Analysis (MTRA) can either serve as a stand-alone tool or complement the METT-SA Version 3. Regardless, it is recommended against relying solely on one tool to improve management effectiveness.

It is important to note that the purpose of this tool is not to evaluate staff performance but to identify gaps in management to ensure an adaptive management approach is adopted. Effective management is only possible if current practices can be examined and improved.

If confidentiality is important to the participating reserve, a confidentiality agreement can be used. I reiterate that the purpose of this study is not to evaluate a specific reserve's management effectiveness but to rather evaluate the appropriateness of the current management effectiveness tool being implemented in South Africa.

An Excel document with all the worksheets have been included in the MTRA package which can be used instead of hardcopies. Using the Excel document will allow scores to be automatically calculated. Similarly, the questionnaire can be completed using this Word document.

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2. MTRA Tool Guide

This guide includes the steps to be taken to complete the tool and subsequent questionnaire.
See page 19 for a step-by-step guide of the worksheet.

Please ensure enough time is set aside to complete the tool in one sitting. Dialogue between the participants should be encouraged to allow for an accurate account of all threats to be recorded.

1. ***Define the study in space and time***.

   Complete the top section of the MTRA Index Worksheet. In the site description, define the biodiversity in terms of area and/or species.

   PA Description– if the study area is too large, choose a specific section of the reserve;

   Assessment period – decide on a time frame not longer than 5 years, preferably a time frame similar to the one used in the METT (if applicable)

2. ***Identify all current direct threats present at the site.*** Threats are defined as those human activities that cause some degree of deterioration or destruction of the biodiversity in the site. Threats can be divided into:
   a. *Internal Direct Threats:* caused by stakeholders living on site
   b. *External Direct Threats*: caused by people outside the PA
   c. *Indirect Threats*: Social, economic and political aspects that provoke direct threats. These are not to be included

3. ***Define the threats.*** Among participants, discuss threats and define each according to the IUCN lexicon of threats categories (please see pg. 7-11)

   Write a clear and precise definition of each threat on Worksheet 3.

4. ***Define 100% reduction for each threat.*** 100% reduction is assumed to be a complete elimination of a threat. Write a clear and precise definition on the same worksheet used for Step 3.

   If it is recognised that a 100% reduction is not feasible, a different definition of 100% reduction can be made.

5. ***Rank each threat for the defined start date, based on the following:***

   It is vital to consult reports and discuss with colleagues to minimise subjectivity and increase validity of this method.

   a. **Area –** how much of the habitat is affected by the threat?

      Assign the highest number to the threat that affects the greatest area, and the lowest number (always 1) to the threat that affects the smallest area. Avoid ranking threats equally, thus if e.g. 8 threats are identified, values should be 1,2,3…8.

   b. **Intensity-** how severe is the impact of a threat in the site? Does the threat completely destroy the habitat or just cause minor changes?

      Assign the largest number to the most intense threat and continue till the least severe threat is ranked #1. Again, avoid assigning the same number to more than one threat.

   c. **Urgency –** how immediate is the threat? How urgent is it for management actions to mitigate this threat?

2. MTRA Tool Guide cont. *see page 13 for a step-by-step guide of the worksheet*

Using the same worksheet used in Step 5, continue with the next steps -

6. ***Add up the scores to calculate each threat's total rank***
   Review the rankings and decide if this is a true representation of the threats, modifications are allowed, to increase the legitimacy of the results.
7. ***Decide how much (%) has the threat changed since the chosen start date (add information to Worksheet 5).***
   a. If a threat was present at the start date and has been reduced, the score will be positive. If it is completely eliminated, the top score is 100%.
   b. If a threat has worsened since the start date, the score will be negative. There is no cap for a negative score so if you think that something has worsened 4 times, that threat can be given a score of -400%.
   c. If a threat was not present at the start date, but has emerged since then, that threat can be given a score of -100%.
8. ***Calculate each threat's raw*** score by multiplying its total rank with percentage of change.
9. ***Calculate the MTRA Index*** by dividing the total raw score with the total ranking and then multiplying it with 100 to get a percentage.

   This score is used to estimate the degree to which the threats were reduced relative to the clear 100% reduction definitions agreed upon in Step 4.
10. ***Discuss the reasons behind the changes as indicated by the MTRA Index.***
    What were the positive actions taken? Which management strategies have changed since the start date? How is management effectiveness measured in your area?
11. ***Please complete the questionnaire***

Appendix C - Threat Definition and 100% Reduction Worksheet

Please discuss and finalise threats with other participants prior to completing this table

NO.	THREAT	IUCN THREAT CODE	THREAT DEFINITION FOR YOUR RESERVE (PLEASE ELABORATE IF NECESSARY)	EXPLANATION OF 100% REDUCTION
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Appendix D - TRA Index Calculation Sheet

PA NAME:			
PA DESCRIPTION:			
ASSESSMENT PERIOD:	TO	(dd/mm/yyyy)	
COMPLETED BY:		POSITION:	
LENGTH OF EMPLOYMENT:	yrs.	COMPLETED ON:	(dd/mm/yyyy)

NO.	THREAT	IUCN THREAT CODE	RANKING CRITERIA			TOTAL RANKING	% THREAT MITIGATION *(next worksheet)*	RAW SCORE
			AREA	INTENSITY	URGENCY			
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
		TOTAL						

TRA INDEX FORMULA	TOTAL RAW SCORE		TOTAL RANKING		CONVERT TO %		TRA INDEX (%)
TRA INDEX CALCULATION		÷		=	X 100	=	

Appendix E - TRA Index Calculation Sheet Supporting Information

NO.	THREAT	% THREAT CHANGE	PLEASE EXPLAIN WHAT MATERIAL WAS USED TO DETERMINE CHANGE IN THREAT
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Appendix F – MTRA Questionnaire

Participant Questionnaire

(please complete the MTRA worksheet before completing the following questionnaire)

SITE NAME:	
COMPLETED BY:	POSITION:
LENGTH OF EMPLOYMENT: yrs.	COMPLETED ON: (dd/mm/yyyy)

(I) Management Effectiveness Evaluation Tool (METT)					
1. How was the reserve evaluating its management effectiveness before the METT was introduced?					
2. Were you involved in previous Management Effectiveness Evaluations (MEE)?					
a) Yes	b) No				
2.1. If yes, which evaluation method did you use, and when was the evaluation(s)?					
2.2. If yes, how do you think MEE can be beneficial for protected area management?					
2.3. If yes, have you noticed any direct changes to management due to any MEE the reserve has undertaken?					
a) Yes	b) No				
Please elaborate					
3. Please indicate to what extent you agree or disagree with the following statements					
3.1. Management Effectiveness Evaluations (MEE) are vital for biodiversity conservation.					
a) Strongly Agree	b) Agree	c) Neutral	d) Disagree	e) Strongly Disagree	f) I don't know
Please explain your choice:					
3.2. The METT is the right tool to use in private protected areas.					
a) Strongly Agree	b) Agree	c) Neutral	d) Disagree	e) Strongly Disagree	f) I don't know
Please explain your choice:					
3.3. The METT tool evaluates all the important aspects of protected area management.					
a) Strongly Agree	b) Agree	c) Neutral	d) Disagree	e) Strongly Disagree	f) I don't know

Please explain your choice:					
3.4. Since the reserve in question started using the METT, it has increased cooperative management with the surrounding PAs.					
a) Strongly Agree	b) Agree	c) Neutral	d) Disagree	e) Strongly Disagree	f) I don't know
Please explain your choice:					
(II) The Modified Threat Reduction Assessment (MTRA)					
3.5. You found the MTRA tool easy to use.					
a) Strongly Agree	b) Agree	c) Neutral	d) Disagree	e) Strongly Disagree	f) I don't know
Please explain your choice:					
3.6. The MTRA tool is useful for management					
a) Strongly Agree	b) Agree	c) Neutral	d) Disagree	e) Strongly Disagree	f) I don't know
Please explain your choice:					
3.7. In your opinion, the MTRA results represent an accurate representation of how threats have been managed?					
a) Strongly Agree	b) Agree	c) Neutral	d) Disagree	e) Strongly Disagree	f) I don't know
Please explain your choice:					
3.8. In your opinion, the MTRA tool can be used as a stand-alone tool to improve management effectiveness?					
g) Strongly Agree	h) Agree	i) Neutral	j) Disagree	k) Strongly Disagree	l) I don't know
Please explain your choice:					
(III) Comparing the two tools					
4. Comparing the METT and MTRA tools, which tool do you consider holds the best value for management purposes?					
a) METT		b) MTRA		c) Both the same	

Please explain your choice:		
5. When comparing the two tools, which tool do you prefer?		
a) METT	b) MTRA	c) Both the same
Please explain your choice:		

Warden Questionnaire

SITE NAME:			
COMPLETED BY:		POSITION:	
LENGTH OF EMPLOYMENT:	yrs.	COMPLETED ON:	(dd/mm/yyyy)

1. What management evaluation method was being applied before METT was introduced?	
2. How often is the METT applied?	
3. Do you think the frequency of METT evaluation is sufficient?	
a) Yes	b) No
Please explain your choice:	
4. Do you think it would be beneficial to alternate with a simpler Management Effectiveness Evaluation (MEE) tool that only focuses on threats?	
5. What happens after the METT scores are calculated?	
6. What have been the major management consequences as a result of the METT scores?	
7. Are the METT scores being used alongside biodiversity indicators to improve biodiversity conservation?	
8. Which stakeholders are involved in using the tool?	

9. Were the same participants involved in all previous times METT was applied?					
10. Would you recommend any changes to METT?					
a) Yes			b) No		
Please explain your choice:					
11. *Indicate to what extent you agree or disagree with the following statements*					
11.1. Management Effectiveness Evaluations (MEE) are vital for biodiversity conservation.					
a) Strongly Agree	b) Agree	c) Neutral	d) Disagree	e) Strongly Disagree	f) I don't know
Please explain your choice:					
11.2. The METT is the right tool to use in private protected areas.					
a) Strongly Agree	b) Agree	c) Neutral	d) Disagree	e) Strongly Disagree	f) I don't know
Please explain your choice:					

Appendix G – Stakeholder Questionnaire

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Thank you for taking the time to answer questions pertaining to my study!

The goal of this questionnaire is to ascertain how appropriate the Management Effectiveness Tracking Tool (METT) is for private PAs and what the general opinion is regarding its application.
If you have any questions, please don't hesitate to contact me.

1. When was METT first introduced into […] private PA?
a. Why was METT introduced?
b. How many assessments have been completed since the first introduction?
c. How frequent is the assessment?
i. Do you consider this to be sufficient? Please elaborate
2. Is the assessment facilitated by you or a consultant?
a. Has training been provided? Did you feel it to be adequate?

3. How involved are provincial officials with the assessment?
4. Are different stakeholders involved in the assessment? If yes, please elaborate
a. Have the same stakeholders been involved for every assessment?
5. Do the scores get screened/audited? By whom?
6. What happens when the scores are below average?
7. Do you consider Protected Area Management Effectiveness (PAME) evaluations to be beneficial for conservation? Please elaborate
8. How was PA success being monitored before METT was introduced?
9. Have you had any previous experience using other PAME tools other than METT? If yes, please elaborate

10. What is your opinion on the METT? Do you consider it to be the best tool to use for private PAs in South Africa? Please elaborate
11. Has the METT scores resulted in any changes to management?
12. What has been the greatest challenge implementing METT?
13. If you could change a few elements of the METT, what would you change?
14. Is any research being undertaken to determine links between effective management and conservation outcomes? (i.e. what interventions have a direct impact on conservation outcomes)
15. Do you think MEE should become mandatory? Please elaborate
16. If you have any additional information, please use the space below

Thanks for your time!
Stay safe

The first page of the questionnaire was modified for Practitioners/ Coordinators:

1. Does the province have a long-term plan of implementing METT within private PAs? a. If yes, please elaborate
2. How involved are provincial staff in METT and introducing it to private PAs?
3. How many private PAs have undergone Management Effectiveness Evaluations (MEE)?
4. Which PA designation types have undergone Management Effectiveness Evaluations (MEE)? (i.e. conservation areas, protected areas or biodiversity partnership areas)
5. Do the private landowners/wardens complete the assessment or a private consultant?
a. If PA staff conduct assessments, is there continuous training for them or is it a once off? Please elaborate
b. What does METT training entail?
6. Where do the funds come from to conduct the assessments?

Appendix H – Indicators from the METT-SA 3a used to development the framework

Two management spheres:

Integrated management planning A site specific, updated and approved management plan with set measurable objectives is fully integrated with subsidiary management plans. Threats and risks have been identified and mitigating actions noted. The annual plan of operation (APO) is developed from the integrated management plan and is linked to available budget. Principles of adaptive management are being applied.	1.6 Risk assessment
	2.2 Management plan
	2.1.2 Delineation of a zone of influence
	2.1.3 Corridor management plan
	2.2.1 Conservation development framework (CDF)
	2.4 Management plans for significant cultural heritage assets
	2.5 Biodiversity management plans for cultural heritage sites with biodiversity values
	2.6 Restoration of degraded areas
	3.1 Management research programme
	3.1.1 Monitoring and evaluation programme
	4.1 Annual plan of operation (APO)
	4.2 Standard operating procedures
	5.2.1 Integrated compliance plan
	5.4 Linking of management plan to key performance areas
Biodiversity resource management Biodiversity assets are known and understood. External influences are identified and actions taken to mitigate these. The setting of targets and development of environmentally responsible management programmes contributes to biodiversity targets being met, ecological processes being maintained and the delivery of ecosystem services.	1.4. Biodiversity knowledge and understanding
	1.5.1 Format of data
	1.6 Risk assessment
	2.6 Restoration of degraded areas
	3.1 Management research programme
	3.1.1 Monitoring and evaluation programme
	3.1.2 Relationship with researchers
	4.12 Sustainable extractive use
	4.13 Management of hazardous substances
	4.16 Environmentally responsible practice
	5.1 Tourism infrastructure (mitigating impacts)
	6.2 Achievement of biodiversity targets
	6.3 Ecological processes
	6.5 Land use planning and management outside of the site
	6.6 Water use planning and management operations influencing the site
	6.4 Ecosystem services

Relevant Indicators

	QUESTION	SCORE & NOTES	
CONTEXT	Q 1.6 Risk Assessment Has a risk assessment or similar been conducted for the site?	0/1	Elephant numbers/ Stream pollution/ Alien invasive plants
PLANNING	Q 2.1.2 Delineation of a zone of influence Has a zone of influence based on influences and sensitivity been defined surrounding the site?	1/3 No zone of influence has been established, but the desktop delineation is complete and compatible land uses have been identified	
	Q 2.2 Management Plan Is there an approved management plan as required by the relevant legislation?	1/3 A management plan with measurable objectives is being prepared or has been prepared	
	Q 2.2.1 Conservation Development Framework (CDF) Is there a zoning system based on a sensitivity analysis in place?	0/1	
	Q 2.6 Restoration of degraded areas Is there a plan for rehabilitation of degraded areas?	1/1 There is a plan for addressing degraded areas within the site (requirement within the Cooperative Agreement)	
INPUTS	Q3.1 Management research programme Are research projects relevant to achieving the set management objectives of the site?	2/3 Research needs to have been identified, but only critical management objective orientated research is being done	Invasive alien plant control/ Elephant pressure
	Q 3.1.1 Monitoring and Evaluation Programme Is there an active long-term monitoring and evaluation programme that measures the level of achievement of objectives against set baselines?	3/3 There is an established monitoring and evaluation programme which is fully implemented with site management participation and is used to guide adaptive management	Invasive alien plant control/ Elephant pressure
PROCESS	Q 4.1 Annual Plan of Operation (APO) Is there an APO or annual work plan with set targets linked to the management plan?	1/3 An APO exists but activities are not linked to the management plan targets for the site	

OUTPUTS	Q 5.1 Tourism infrastructure (mitigating impacts) Does tourism infrastructure mitigate visitor impacts?	1/3 Visitor impacts are not mitigated by the design of the tourism infrastructure which would result in degradation of the environment	Open Safari Vehicles/ Development
OUTCOMES	Q 6.2 Achievements of biodiversity targets Are the biodiversity assets and values being managed as best possible targets to meet objectives as set in the management plan?	2/3 All critical biodiversity targets are being met or are on track to being met	Invasive alien plant control
	Q 6.3 Ecological processes Does the site management effectively maintain the ecological processes critical for the achievement of biodiversity targets?	1/3 Ecological processes are only partially maintained with some ecological integrity and biodiversity being compromised	
	Q 6.5 Land use planning outside of the site Do the land use planning and management practices of the surrounding areas support biodiversity objectives of the site?	0/3 Land use planning does not take into account the needs of the site and is detrimental to the site	
	Q 6.6 Water use planning and management operations influencing the site Does water use planning and management take cognisance of the site and the achievement of the site objectives?	2/3 Water use planning and management partially takes into account the long term needs of the site	Polluted stream/ Development