

**Investigating the contribution of the biodiversity stewardship
programme in achieving grassland biome conservation in
KZN, South Africa**

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Abstract

Research into biodiversity stewardship and its potential as a mechanism for conservation implementation in South Africa is limited. Conservation implementation tools aimed at achieving conservation targets are espoused in systematic conservation planning (SCP). This research investigated the SCP approach in South Africa and sought to develop a deeper understanding of the effectiveness of the biodiversity stewardship programme as a tool for grassland conservation in KwaZulu-Natal (KZN). Geographical Information Systems (GIS) operations were performed to ascertain current site selection and identify potential future site suitability, and to understand the implications of these outputs in meeting grassland biome conservation. A case study analysis of three biodiversity stewardship sites was undertaken to provide an overview of the KZN biodiversity stewardship programme and to understand the role it plays in grassland biome conservation. Biodiversity stewardship site assessments were conducted at all three case study sites by Ezemvelo KwaZulu-Natal Wildlife (EKZNW), to identify and assess the biodiversity value, threats associated with the land uses and the potential for conservation based on the principles of SCP. This research utilised these assessments extensively to answer key objectives and the GIS operations was used to understand the spatial considerations. Primarily, this research sought to understand the implementation prospects of biodiversity stewardship and develop insights into how implementation can be improved. A series of semi-structured interviews were conducted with a number of key stakeholders in the biodiversity stewardship programme. Through a thematic analysis and coding process, the key themes, which emerged included lack of capacity, lack of funding and poor follow-up. Despite the obstacles and risks identified, the perceptions of the key stakeholders towards the biodiversity stewardship programme were found to be mostly positive. Strengthening linkages with NGOs is perceived by many stakeholders to be the key to overcoming capacity problems within the biodiversity stewardship programme. The strengthening of aspects of management is fundamental in achieving grassland conservation, as the effectiveness of biodiversity stewardship achieving targets is based on the probability of the management objectives being met. Improved support, follow up and extension on grazing, burning and IAS clearing will aid in successful management of the grassland biome. The implementing of biodiversity stewardship is seen as a credible process to secure critical grassland biodiversity.

Keywords: Systematic conservation planning, grassland biodiversity conservation, stakeholder perceptions

Declaration

This dissertation was undertaken in fulfilment of the Geography Masters of Science degree and represents the original work of the author. Any work that is taken has been acknowledged in the text and reference chapter.

.....

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List of acronyms and abbreviations

BBCONR	Bill Barnes Crane and Oribi Nature Reserve
BotSoc	Botanical Society of South Africa
BMA	Biodiversity Management Agreement
BSSA	Biodiversity Stewardship South Africa
CA	Conservation Area
C.A.P.E	Cape Action for People and the Environment
CBD	Convention on Biological Diversity
CR	Critically Endangered conservation status
CREW	Custodians of Rare and Endangered Wildlife
CSIR	Council for Scientific and Industrial Research
DAEA	Department of Agriculture and Environmental Affairs
DEA	Department of Environmental Affairs
DEAT	Department of Environment Affairs and Tourism
DWA	Department of Water Affairs
EGS	Ecosystem Goods and Services
EIA	Environmental Impact Assessment
EN	Endangered conservation status
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EWT	Endangered Wildlife Trust
GIS	Geographic Information Systems
IAS	Invasive Alien Species
ICAs	Informal Conservation Areas
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IUCN	International Union for the Conservation of Nature
KZN	KwaZulu-Natal Province
LED	Local Economic Development
LT	Least Threatened conservation status
MTPA	Mpumalanga Tourism and Parks Agency
MBCP	Mpumalanga Biodiversity Conservation Plan
MEC	Member of the Executive Council

MOU	Memorandum of Understanding
NBF	National Biodiversity Framework
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environmental Management Act (Act 107 of 1998)
NEM: BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM: PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003)
NGO	Non-government organisation
NPAES	National Protected Area Expansion Strategy
NP	National park
NSBA	National Spatial Biodiversity Assessment
NSoER	National State of Environment Report
NR	Nature Reserve
PA	Protected area
RDL	Red Data List
SA	South Africa
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SBP	Systematic biodiversity planning
SCP	Systematic Conservation Planning
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SKEP	Succulent Karoo Ecosystem Programme
VCA	Veld Condition Assessment
VU	Vulnerable conservation status
WWF	World Wildlife Fund
WoF	Working on Fire

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Chapter 1. Introduction

Biodiversity stewardship is a fundamental tool for conservation of threatened biomes in South Africa, specifically the grassland biome. South Africa boasts one of the richest biodiversities in the world (Crane, 2006). Despite the rich biodiversity, many species are threatened. Habitat destruction, pollution, invasive alien species (IAS) and poor conservation management accelerate biodiversity loss (Humphries Williams and Vane-Wright, 1995; Orlove and Brush, 1996; Department of Environmental Affairs and Tourism (DEAT), 2005; Groves, 2003). Modification and transformation of almost all South Africa's habitats and ecosystems is apparent (DEAT, 2005).

The Convention on Biological Diversity (CBD) is an international policy directive for achieving biodiversity conservation. The formation of protected areas (PAs) is one of the main approaches of the CBD to improve biodiversity conservation. PAs protect ecosystems and areas of rich biodiversity that would otherwise be threatened (Margules and Pressey, 2000). Globally, the existing PAs have not always been systematically selected and designed. Ideally conservation planning should address location, design, size and connectivity to ensure the long-term preservation of species (Eken Bennun, Brooks, Darwall, Fishpool, Foster, Knox, Langhammer, Matiku and Radford, 2004; Margules and Pressey, 2000). Connectivity and buffers incorporated into planning enable genetic exchange, migration of species and climate change mitigation (Berliner, van der Merwe, Benn and Rouget, 2006). Consideration of representation and persistence of species will also strengthen conservation planning. Representation ensures that there is a wide range of species represented in a proposed conservation area. Persistence "requires maintenance of environmental processes, inclusive of ecological, evolutionary, geomorphological, and hydrological processes" (Knight, Driver, Cowling, Maze, Desmet, Lombard, Rouget, Botha, Boshoff, and Castley, 2006: 743).

Conservation planning and implementation in South Africa has been through many transformations. The adoption of other countries' ideologies regarding conservation planning is evident. South African policy, legislation and institutions guiding biodiversity conservation are influenced by the CBD (Biggs, Simons, Bakkenes, Scholes, Eickhout, van Vuuren and Alkemade, 2008). The South African National Biodiversity Institute (SANBI) was formulated to focus specifically on terrestrial, marine and aquatic ecosystems biodiversity (DEAT, 2005). SANBI is pivotal in conservation planning, research, monitoring and reporting on issues of biodiversity in South Africa (DEAT, 2005).

In South Africa, it is now common practice to implement systematic biodiversity planning (SBP), also referred to as Systematic Conservation Planning (SCP) (SANBI, 2009a). SCP involves a meticulous and data-driven approach that geographically isolates spatial priority areas for conservation (SANBI, 2009a). Characteristically systematic approaches should be data driven, goal orientated, efficient, transparent, repeatable and flexible (Pressey, 1999). Flexibility allows for the application of the SCP approach to all biomes and ecosystems. Globally, biodiversity loss occurs within all biomes. The grassland biome made up

of different grassland vegetation types (hereafter ‘grasslands’) has the highest potential of being altered or lost (Aguiar, 2005). Many types of grassland have a high irreplaceability as they contain biodiversity features that cannot be secured for conservation elsewhere. As grasslands are an integral part of the world’s system, it is important to conserve them in the best possible way to ensure long-term persistence. Conservation action includes a variety of different activities, both inside and outside of formally PAs. International legislation and experiences drive the broad approach to conservation in South Africa particularly grassland conservation. South Africa has elaborate legislation relating to biodiversity conservation and it has been incorporated into the national, provincial and local spheres of government. South Africa’s national sphere of government ensures appropriate frameworks for conservation are implemented, and finer scale conservation planning is integrated into both provincial and local levels (DEAT, 2005). Cooperation between different departments and levels is significantly important for consistency, transparency and efficiency (Ferrar and Lötter, 2007)

South Africa is a signatory to the CBD, depicting commitment to combating land degradation and conserving biodiversity (Cupido, 2005). Aligning with the commitment to the CBD, South Africa designed a National Biodiversity Strategy and Action Plan (NBSAP), a key driver in the formulation of biodiversity conservation policies. Forming part of the NBSAP is the National Spatial Biodiversity Assessment (NSBA), a comprehensive spatial assessment of the biodiversity of terrestrial, river, estuarine and marine ecosystems (Driver, Maze, Rouget, Lombard, Nel, Turpie, Cowling, Desmet, Goodman, Harris, Jonas, Reyers, Sink, and Strauss, 2005:1). The NSBA is used to identify priority areas for conservation (Biggs et al., 2006). The assessments guide and influence national and provincial government in decision making and planning formulated by the Department of Environmental Affairs and Tourism (DEAT) (Driver et al., 2005), now known as Department of Environmental Affairs (DEA).

Forming part of an array of tools and strategies for conservation planning in South Africa is the biodiversity stewardship programme (Ferrar and Lötter, 2007). Using the outcomes of SCP, areas of biodiversity significance are identified, secured and then managed by the landowner. Land excluded from formal PAs having a high biodiversity value is conserved through legal partnerships between the landowner and a conservation body/authority (Ezemvelo KwaZulu-Natal Wildlife (EKZNW), 2009). Biodiversity Stewardship South Africa (BSSA), initially conceptualised by non-governmental conservation organisations World Wildlife Fund (WWF) and the Endangered Wildlife Trust (EWT), was developed by the then DEAT (EKZNW, 2009). BSSA is now an umbrella programme that is making headway in conserving biodiversity outside of state owned land: “The programme helps to implement provincial conservation plans through a consistent, national, landscape-scale approach to stewardship. It also assists government in meeting the targets set out by the National Spatial Biodiversity Assessment (NSBA) and the National Biodiversity Framework (NBF)” (EKZNW, 2009: no page). Tools such as the biodiversity stewardship programme formulated under BSSA, form part of these provincial plans to conserve areas of specific concern.

This research critically assesses the potential of the KZN biodiversity stewardship programme to contribute to achieving grassland biome conservation in the province. An overview of the KZN biodiversity stewardship programme aids in the understanding of the role it plays in grassland conservation. The GIS operations verify current site suitability and identify potential future biodiversity stewardship sites. More importantly, the research seeks to develop a deeper understanding of the implementation prospects of biodiversity stewardship from the perspective of all the stakeholders involved in stewardship and develop insights into how implementation of biodiversity stewardship can be improved.

1.1 Rationale for the study

To understand the context and need for a study such as this, the rationale and need for the study is argued.

Despite the vast literature on broad conservation practices and ideologies, there is limited research on proactive and participatory conservation initiatives specifically for KZN and South Africa. This research firstly illustrates and evaluates SCP in South Africa. Drawing from these findings, the usefulness and effectiveness of biodiversity stewardship as an option for conservation in South Africa, specifically for grasslands, is explored. Contemporary conservation is characterised by complexity due to multiple role players. Gaining insights into the benefits and barriers to stewardship is key to understanding the merits of stewardship as a mechanism for achieving conservation targets, yet there is limited research on these stakeholder dynamics. This research study fills vital gaps in the current literature base on the process and perspectives on the biodiversity stewardship. From the evaluation of three biodiversity stewardship case studies, the evident success of biodiversity stewardship as a tool for the grassland conservation became apparent.

1.2 Aim and objectives

1.2.1 Aim

Critically assess the potential for the KwaZulu-Natal biodiversity stewardship programme to contribute towards achieving grassland biome conservation objectives in the province.

1.2.2 Objectives

To achieve this broad goal, the research project focused on several key research objectives. These are to:

- i. Conduct a desktop investigation of the approach, methods and gaps in systematic conservation planning and the status of grassland biomes in South Africa;
- ii. Provide an overview of the KwaZulu-Natal biodiversity stewardship programme and attempt to understand the role it plays in grassland biome conservation;
- iii. Review in a GIS environment different KZN conservation plan datasets to verify current and identify potential future biodiversity stewardship site suitability; and
- iv. Understand the implementation prospects of the biodiversity stewardship programme from the perspective of all the stakeholders involved in stewardship and develop insights into how implementation can be improved.

1.3 Structure of the dissertation

This section briefly describes and highlights the content of the dissertation.

Chapter one: Introduction

This chapter identifies the problem area and the aim and objectives of the thesis are defined. This chapter also includes the rationale for the study.

Chapter two: Literature review

The literature review establishes a background for the subject of conservation and identifies the past trends and successes as well as major downfalls. The current practice is also identified for conservation planning in South Africa. The gaps in previous research on the topic of SCP, specifically within the grassland biome, are discussed. An examination of the literature relating to SCP enables the focus on important issues and variables of the research objectives. Biodiversity stewardship as a mechanism for conservation is explored. The literature review also forms part of the methodology of a documentary analysis identifying gaps in previous research, as well as validating current practice in South Africa.

Chapter three: Background and case studies

This chapter identifies the biodiversity conservation strategies and policies of EKZNW to set the local context for the research. The case study sites are examined in detail. This enables the reader to understand

the context of the biodiversity stewardship programme (BSP) in the province, with a specific focus on grasslands.

Chapter four: Methods

This chapter describes the research design and sampling process associated with this research project, identifying the different quantitative and qualitative methods that were utilised in the research. The methods used involved a documentary analysis, GIS operations of the biodiversity stewardship study sites and semi-structured interviews. The methods selected were used to answer the research question and to test and validate the aim and objectives.

Chapter five: Spatial considerations for the biodiversity stewardship programme

Chapter Five provides a description of the results and discussion of the spatial considerations for stewardship site selection and understanding the contribution of these sites to grassland biome conservation objectives. This chapter reviews in a GIS environment the EKZMW conservation datasets, namely the 2007 C-Plan used to originally identify the stewardship sites, and the updated 2010 TSCP, to verify current site selection and identify potential future site suitability; and understand the implications of these outputs for grassland biomes in KZN.

Chapter six: Stakeholder Perceptions

This chapter identifies the results and discussion of the final research objective. Insights into the benefits of and barriers to the effective implementation of biodiversity stewardship in KZN and South Africa are gathered from interviews and discussions with key stakeholders. Stakeholder views on key challenges, opportunities, obstacles and possible solutions are presented and discussed.

Chapter seven: Conclusion

This chapter revisits the aim and objectives that were outlined in chapter one. Recommendations of the research are also presented, and a conclusion is drawn.

References

All the references and sources of information used in the dissertation are acknowledged in-text and are listed in full at the end of the dissertation.

Chapter 2. Literature Review

To gain a broad understanding of the process and practice of conservation in South Africa, books, journal articles, governmental documents and internet sites are reviewed. Conservation practice and the evolution of the conservation process both globally and in South Africa are examined. Particular attention is paid to SCP and the conservation of grasslands outside of formal PAs.

2.1 Introduction

Biodiversity relates to the richness of species, it has been expanded to include the varieties, race, habitat types and life forms of species richness (Büchs, 2003). The World Wildlife Fund (WWF) has identified species richness as a fundamental goal for conservation (Büchs, 2003). Biodiversity became a popular term only after the signing of the Convention of Biological Diversity (CBD) in Rio de Janeiro in 1992 (Büchs, 2003). The main objectives of the CBD are to have sustainable use of biodiversity, and for the sharing and benefits from the use of biodiversity to be fair and equitable (DEA and SANBI, 2009b). International policy directives such as the CBD influence and guide conservation in South Africa (Berliner and Desmet, 2007).

The economic and social sector of South Africa is heavily reliant on direct and indirect uses of biodiversity (DEAT, 2005). The extensive use of biodiversity for foods and fibres has rendered it highly threatened. To reduce and prevent further biodiversity loss, South Africa has well-structured legislation. The Constitution (Act No. 108 of 1996) makes allowances for environmental consideration. In addition, the National Environmental Management Act 1998 (NEMA) Act 107 of 1998 calls for sustainable use and further expansion of PAs. Under NEMA there are other legal instruments such as the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) and the National Environmental Management: Protected Areas Act 2003 (Act 57 of 2003) (NEM: PAA). Conservation planning in South Africa is governed by the legislature outlined above, and the guiding principles of systematic conservation planning (SCP) enable conservation goals and targets to be achieved and maintained.

Nationally and internationally, SCP is currently the standard approach to conservation planning. SCP forms the basis for reaching conservation goals in South Africa (SANBI, 2009a). SCP identifies priority PAs and promotes integration with other plans and implementation, monitoring and management of PAs. The identification of priority areas for biodiversity conservation is one of the main attributes of SCP (SANBI, 2009a).

Biodiversity stewardship is an implementation mechanism that aids in achieving conservation objectives as set out by SCP. Biodiversity stewardship enables the expansion of the PA network and the sustainable use of biodiversity outside of formal PAs (DEA and SANBI, 2009; Reeves and Marom, 2009; McCann, 2011). Biodiversity stewardship is a fundamental tool for conservation of threatened biomes in South Africa, specifically the grassland biome. The grassland biome is extensively used and exploited; moreover, it is

poorly conserved (O'Connor and Kuylar, 2009). The grassland biome has a number of different grasslands, of which only a few are under formal protection (White, Murray and Rohweder, 2000).

The guiding principle of biodiversity stewardship is for landowners to take conservation into their own hands. Based on legislation, biodiversity stewardship secures land under the formal PA network and encourages sustainable management and use of resources outside of the PA network (McCann, 2011). The securing of critical biodiversity under the PA networks and efficiently managing biodiversity outside of the PA network is vital for conservation.

The realisation of a poor approach to conservation has resulted in a vast literature base which explores how to conserve as many species in the smallest area possible (Margules and Pressey, 2000; Fjeldsa and Tushabe, 2005). SCP addresses many of the past limitations of previous conservation planning techniques and it is critically examined below.

2.2 Systematic conservation planning

SCP has been widely received internationally and countries such as Australia and the United States of America are at the forefront of SCP (Margules and Pressey, 2000; Pierce, Cowling, Knight, Lombard, Rouget, and Wolf, 2005; Pressey, 1999). The popularity of SCP is owed to the fact that it is a systematic way of selecting reserves that adequately represent biodiversity (Margules and Pressey, 2000; Smith, Goodman and Matthews, 2007). Reserve selection has negative connotations for many people as it slows extraction of natural resources and competes with other land uses (Margules and Pressey, 2000; Berliner et al., 2006).

It is argued by Smith et al. (2007) that most PA networks fail to safeguard biodiversity elements of high importance. An approach such as SCP is thought to be one of the most effective methods for designing PAs and ecological networks. SCP is data-driven, meticulous, involves a wide range of stakeholders and priority areas are spatially identified (SANBI, 2009; Smith et al., 2007). Key principles of SCP include representation, persistence, setting of quantitative targets and spatial efficiency, these characteristics will be examined in more detail below (DEA and SANBI, 2009a; SANBI, 2009; Margules and Pressey, 2000; Driver et al., 2005).

Representation

A representative sample of biodiversity is considered in the planning process. Representation requires the features of biodiversity to be adequately accounted for, whereby representation should achieve maximum coverage with a minimum cost (Sarkar, Pressey, Faith, Margules, Fuller, Stoms, Moffett, Wilson, Williams and Williams, 2006).

Persistence

Persistence of the conservation area requires key ecological, hydrological, geomorphological and evolutionary processes to be taken into consideration (Knight et al., 2006). The inclusion of these processes ensures the persistence of biodiversity.

Setting of quantitative targets

Targets are a vital component of SCP. They provide a baseline to identify how much biodiversity still needs to be conserved. Ideally, targets are set to ensure a natural or 'near-neutral' functioning of the entire ecosystem (Driver et al., 2005; Scholes and Biggs, 2005).

Spatial efficiency

Spatial efficiency stipulates the selection of the smallest area to conserve the highest amount of biodiversity (Cadman et al., 2010). In being spatially efficient, there should be conflict avoidance and ecological connectivity. Threats and vulnerabilities are to be avoided; these avoided areas are then seen as priority areas for biodiversity conservation (Cadman et al., 2010). In avoiding conflicts with other land uses, detrimental effects to biodiversity are minimised.

2.2.1 Characteristics of a systematic conservation plan

The fundamental characteristics of SCP suggest that the SCP should be flexible, data driven, goal directed, efficient, repeatable and transparent (Pressey, 1999; Berliner et al., 2006). These characteristics aid in achieving the principles of representation, persistence, setting of quantitative targets and spatial efficiency.

Data driven. An SCP requires the integration of several different data sets (Pressey, 1999; Berliner et al., 2006). To inform decision-making, tools such Geographic Information Systems (GIS) can be used to integrate a number of data sets such as vegetation types, species distributions and conservation status.

Goal-directed. The use of quantitative targets aid in identifying explicit goals (Pressey, 1999). Essentially a target needs to ensure that a population is able to maintain evolutionary processes (Cowling et al., 2003).

Efficient. Efficiency is directly correlated to the cost factor. Designating land for conservation is the principal cost; conservation competes with a number of different land uses. Conservation plans need to be efficient to increase likelihood of implementation (Sarkar et al., 2006).

Explicit, transparent and repeatable. Explanation of the selection process ensures repeatability. This facilitates stakeholders to make appropriate decisions regarding the conservation plan and the process is defensible (Berliner et al., 2006; Pressey, 1999).

Flexible. The flexibility of SCP will allow different scenarios to be investigated, and SCP will be applied to a variety of different scenarios with differing goals (Berliner et al., 2006; Pressey, 1999).

These characteristics set SCP apart from other conservation planning techniques. The stages and steps of SCP are systematic and allow for ease of application to a variety of scenarios. SCP allows constant feedback and reevaluation if necessary (Margules and Pressey, 2000; Pressey, 1999).

2.2.2 Stages of systematic conservation planning

The SCP designed by Margules and Pressey (2000) is a six-staged process (Figure 2-1). It involves the compilation of biodiversity data, setting of targets, reviewing of existing conservation areas, selection of additional conservation areas and the maintaining of conservation values (Margules and Pressey, 2000). The plan is not stringent and allows for different feedback and priorities to be included.

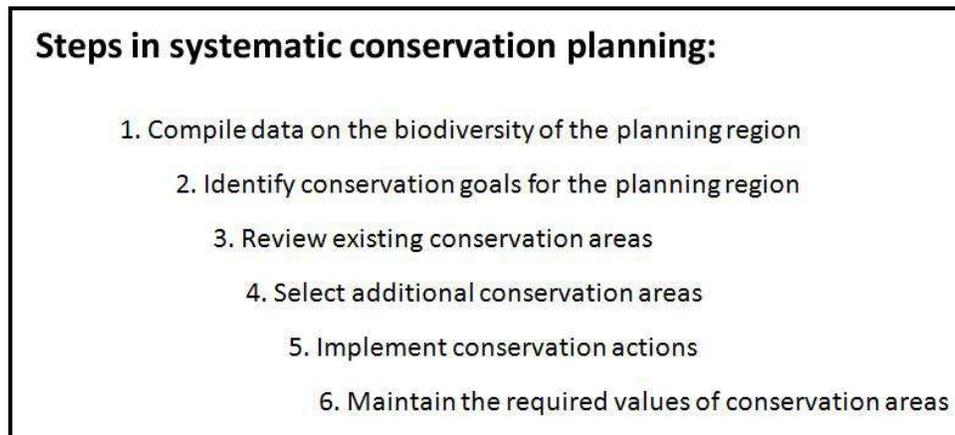


Figure 2-1: Stages in systematic conservation planning (adapted from Margules and Pressey, 2000)

Stage one

The first stage of SCP is to measure and map the biodiversity of the defined area (Margules and Pressey, 2000). It is then spatially analysed and the state of biodiversity is quantified.

Biodiversity is such a broad and multifaceted entity to measure. There are various ways and means to get a quantifiable gauge; surrogates provide such an approach (Margules and Pressey, 2000; Driver et al., 2005; von Hase., et al., 2003; Sarkar et al., 2006). Many bird species are good indicators for ecosystem health, well surveyed, habitat specific and occurring across a wide range of disturbed areas (Wakelin and Hill, 2007). Surrogate species, such as the Blue Swallow (*Hirundo atrocaerulea*), are important for identifying important conservation areas, as they require conservation due to their critically endangered status (Wakelin and Hill, 2007). Surrogate species also form part of a ‘niche-assembly perspective’ and are considered an indicator species (Wakelin and Hill, 2007). If surrogate species are found in an area, it is presumed that the species which it feeds on or where it nests in will also be found in the same area. Primary data sets used in SCP include vegetation samples, species records and herbarium records (Sarkar et al., 2006).

There is much debate as to what level surrogates can be accurately used. The danger in using surrogates is that the user defines what is used, and this can be a subjective process (Sarkar et al., 2006). Policy makers, politicians, the wider public, and non-governmental organisations need to have a draw card concerning biodiversity surrogates; this allows for more proactive and positive decisions (Dudley, Baldock, Nasi and Stolton, 2005). Rare and threatened species are often used as biodiversity surrogates as they pose as a draw card (Escott, 2011).

Surrogate species are generally chosen as they have a particular interest for the specialist involved or there is only data available for that particular species (Dudley et al., 2005). Surrogates also have limitations in terms of data collection bias, as data is often collected for a specific purpose (Margules and Pressey, 2000; Lombard, Cowling, Pressey and Rebelo, 2003; Fjeldsa and Tushabe, 2005). Commonly data is collected in an opportunistic manner; consequently the best collections of data are in the most accessible and convenient areas. A direct correlation between data records and map road networks can be made (Margules and Pressey, 2000).

Poor data pools make it extremely difficult to set realistic targets to measure progress (Dudley et al., 2005). A suite of indicators would be the ideal practice (Dudley et al., 2005). An account of species occurrence coupled with ecological processes would positively influence conservation planning (Margules and Pressey, 2000; Berliner et al., 2006).

Spatial analysis is a vital component in SCP. Gaps in the PA network are identified and wide ranges of datasets are combined. For example, species and vegetation data can be overlaid to aid in spatial prioritising; this will create a more representative PA (DEA and SANBI, 2009a). Transformation layers are also important as they indicate areas where the natural habitat has been lost and thus the value for conservation is diminished (von Hase et al., 2003).

A major limitation of GIS is prediction and over representation of species and vegetation data layers. Available data generally has a coarse resolution and lack of detail; accordingly, conservation targets should be viewed in a theoretical light (Fjeldsa and Tushabe, 2005). There is no guarantee that constructed maps will actually contain viable populations (Fjeldsa and Tushabe, 2005).

A spatial planning tool used in SCP is the C-Plan software. Developed in the early 1990s, it builds on previous work on irreplaceability (Pressey, Watts, Barrett, and Ridges, 2009). Irreplaceability is seen as identifying a way of achieving targets of vegetation types and species. The identification of targets requires planning units to be defined, and generally they follow a grid or hexagonal formation (Margules and Pressey, 2000; Escott, 2011). The planning units can also be defined by watersheds or other such irregular patterns (Margules and Pressey, 2000; Escott, 2011). The extent of occurrence of a feature within the planning unit is quantified and targets are set. Biodiversity features are then represented spatially (Pressey et al., 2009).

“Irreplaceability is a measure of the likelihood of needing any site within a planning region for achieving targets, varying from 1.0 to 0” (Pressey et al., 2009:211). Based on the parameters and targets set out by the user, a higher irreplaceability value suggests that the site has fewer or no replacement, the lower the value the less conservation significance it has and there are other possible sites (Pressey et al., 2009). The identification of sites for conservation management will aid in the achieving of targets. If more targets are achieved, the irreplaceability of other sites will be reduced (Pressey et al., 2009). Conversely, high irreplaceability sites not able to be secured will increase the irreplaceability of other sites (Pressey et al., 2009). Due to this "cause-effect" relationship, this coverage should always be considered as a living surface constantly requiring revision (Escott, 2011:32).

C-Plan is versatile as it can be used on a global or a local scale (Pressey et al., 2009). According to Pressey et al. (2009), the C-Plan is a tool that feeds into the SCP approach. Using C-Plan is beneficial as a vast amount of spatial information is included in the plan. The incorporation into GIS also allows the user to identify locations based on a combination of the user-defined input (Pressey et al., 2009). The output of the C-Plan has categories indicating conservation status. These outputs are useful in the publication of reports and supporting decision making in planning (Pressey et al., 2009). A complementary process to the C-plan is performing a Minset that uses a series of algorithms to identify the best possible sites to achieve conservation. Rules are specified by the user and rules higher in the sequence are more influential (Pressey et al., 2009).

C-Plan and Minset help identify priority sites, which is a vital part of stage one of SCP, measuring and mapping biodiversity. This baseline analysis informs the next stage of SCP that involves goal and target setting.

Stage two

The second stage of SCP is the identification of the goals of the planning area. It is in this stage that targets become the focus (Smith et al., 2007; Margules and Pressey; Berliner et al., 2006). Many targets set out using the rule of thumb and having no biological basis are highly criticised for being misleading (Sarkar et al., 2006; Chape et al., 2005; Margules and Pressey, 2000; Knight et al., 2006). Targets for biodiversity conservation should be “explicit, measurable and repeatable” (Eken et al., 2004:1110). The undertaking of scientifically sound and defensible assessments is important in conservation planning (Knight et al., 2006). The use of targets, which are informed by the most accurate data, will ensure that the principles of SCP are upheld, this strengthens the conservation of biodiversity.

According to Margules and Pressey (2000), targets need to achieve certain aspects. They should:

- be as fine as possible;
- incorporate processes and patterns of biodiversity;
- reveal the level of protection for specific species and landscape;

-
- include the surrounding area; and
 - incorporate economic and social aspects (as will be projected to a political audience).

Targets are influenced by a variety of different theories including the theory of island biogeography that influences the ideology regarding PA size, shape and distance to the surrounding PA network (Margules and Pressey, 2000). The theory identifies the optimum PA to be bigger, rounder and closer or more connected (Margules and Pressey, 2000). Species interactions and persistence of migratory species might be limited in smaller PAs, but the smaller PA may have a higher quality of biodiversity (Margules and Pressey, 2000; Cowling et al., 2003). The surrounding areas may influence the isolated smaller conservation areas water, ground cover, microclimate and nutrient content leading to changes, sometimes favourable and sometimes unfavourable (Margules and Pressey, 2000).

Limitations arise in setting targets as processes such as migrations, ecological processes and scales that species function at differ in space and time (Margules and Pressey, 2000). Certain species require varied amounts of space. Isolation may inhibit the species from persisting as they may require viable populations. Conversely, the territorial nature of the species will inhibit the occurrence of multiple species in that isolated smaller area; this is true for the Oribi (*Ourebia ourebi*) (Margules and Pressey, 2000; Berliner et al., 2006). An examination of the age of the populations, the sex ratios, and structures within an isolated area should be examined. Isolated areas will have limited genetic diversity exchange and humans may have to intervene (Margules and Pressey, 2000). Different mechanisms are used to manage isolated areas. The identification and management of the species that are most demanding of resources, will resultantly protect other species in the isolated area (Margules and Pressey, 2000).

SCP incorporates targets as a guide to inform conservation planning. Once the targets aimed at achieving biodiversity conservation are outlined then planners can evaluate how the current conservation areas are achieving these targets.

Stage three

The third stage of SCP is to review the existing PA network (Margules and Pressey, 2000; Chape et al., 2006). The gap analysis evaluates the PA network identifying any shortfalls in the current conservation network. Gap analysis does not identify the gaps in processes or persistence (Margules and Pressey, 2000; Berliner et al., 2006). Land-use and needs for conservation are constantly changing and hurried implementation of PAs may fail to achieve some of the targets initially set. Planning should not be static and even at a later stage in the SCP stage three, planning should be re-evaluated identifying new priority areas (Margules and Pressey, 2000).

Once the existing PA network is examined, additional PAs can be designed to complement the existing ones (Margules and Pressey, 2000).

Stage four

Stage four of SCP is the selection of additional PAs. The actual selection process is informed by all information composed in stages one, two and three (Berliner et al., 2006). Stage four is associated with the indication of potential costs: planners are able to weigh up the costs and identify if there is a need for trade-offs (Margules and Pressey, 2000; Cowling et al., 2003). The commitment to conservation is also an important factor to consider, existing conservation areas are already committed to conservation. According to Margules and Pressey (2000), if biodiversity targets are to be reached, many agricultural areas will have to be included.

Stage five

The fifth stage is implementation and is arguably the most complicated of all the stages. The involvement of multiple stakeholders with differing and sometimes conflicting interests makes implementation difficult (Margules and Pressey, 2000). The implementation stage also involves the identification of a management strategy. This stage further identifies limitations and difficulties. If areas selected are too degraded or complex to protect, then the planning process can revert to stage four (Margules and Pressey, 2000).

Stage six

Stage six of SCP is the management and monitoring of the PAs. This stage is considered the most demanding of the stages as it continues for a very long period of time (Margules and Pressey, 2000). Due to the changing nature of the natural world and humans influence on the natural environment, management is an important practice. PAs holding only paper status are declared as a PA but do not function effectively due to poor management (Margules and Pressey, 2000). The management of PAs should constantly be keeping in check with the previous five stages. The goals and targets of managing the PAs should be explicit and any new available information and data should be updated and incorporated into management plans (Margules and Pressey, 2000).

Conservation planning has many uncertainties, and even though SCP is a widely adopted process, it has many limitations (Margules and Pressey, 2000). Constant developments in techniques and data sets will improve the SCP process as a whole. South Africa has widely accepted SCP as an approach to conservation planning especially as most of South Africa's threatened biodiversity does not fall under formal protection.

2.2.3 South Africa's biodiversity conservation planning approach

In South Africa, there has been a shift to more SCP based principles. Focus has shifted from planning for representation to planning for persistence (Figure 2-2). However, planning is a guide for action and a limitation of conservation planning is the linking of planning more effectively to implementation (von Hase et al., 2003). SCP addresses this limitation and incorporates implementation into planning (Figure 2-2).

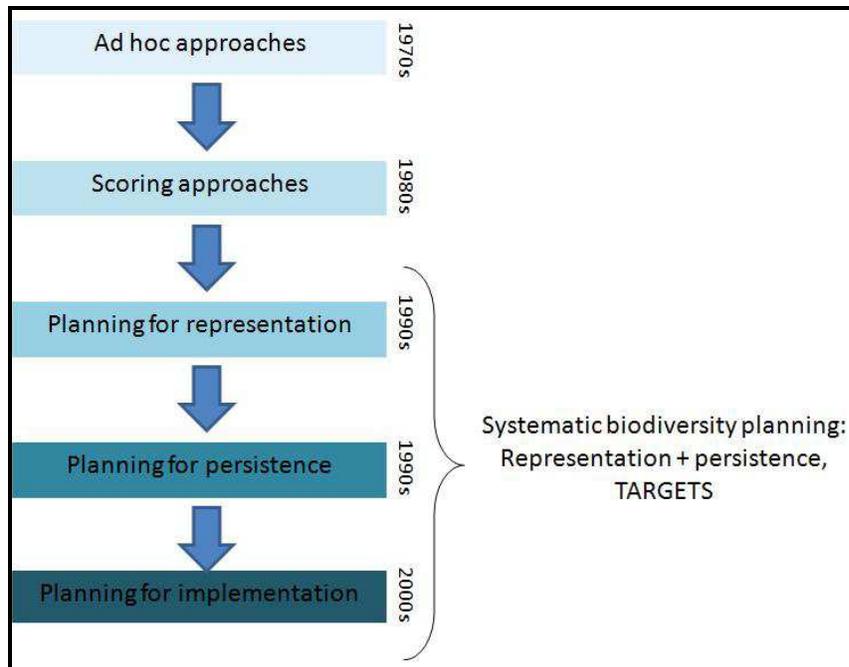


Figure 2-2: South Africa’s approaches to conservation (adapted from McCann, 2011)

In recent times, South Africa has adopted a systematic approach to conservation following Australia and the United States of America (Berliner et al., 2006; Ferrier, 2002). The systematic approach to biodiversity conservation aims at achieving goals and targets. These targets ensure representation, persistence, ecological connectivity and spatial efficiency (Berliner et al., 2006; Ferrier, 2002; Margules and Pressey, 2000).

South Africa has strengthened its biodiversity planning techniques over the past decade, the development of innovative concepts and tools are supported by provisions in policy and legislation (Cadman et al., 2010). To achieve these targets in South Africa there are two strategies, namely the consolidation and expansion of PAs through National Environmental Management: Protected Areas Act 2003 (Act 57 of 2003) (NEM: PAA) and integrated management aimed at the conservation of ecosystems and biodiversity priority areas outside of the PA network in terms of NEM: BA (SANBI, 2009a).

The recently updated (Mucina and Rutherford, 2006) vegetation map coupled with extensive river and wetland maps has made national assessment of ecosystem status possible, enabling systematic biodiversity assessments (Cadman et al., 2010). In aligning with SCP, areas that are required to reach biodiversity targets (critical biodiversity areas (CBAs)) are included into planning (Cadman et al., 2010). Essentially areas that are important in terms of ecological corridors are considered CBAs. Other essential areas such as wetlands and riparian zones are also given high priority aligning with the SCP principle of persistence (Cadman et al., 2010; Driver et al., 2005). Consideration of species migration, fragmentation avoidance, varying topographic features and considering gradients aid in resilience of ecosystems (Cadman et al., 2010; Driver et al., 2005).

“The products of systematic biodiversity planning include maps displaying networks of critical biodiversity areas and ecological support areas, and land-use guidelines linked to these areas” (Cadman et al., 2010:44). South Africa has a number of biodiversity plans at different scales; these vary according to their planning and decision making purposes. Broader scaled maps are used in national or provincial planning identifying broad areas of conservation importance. Finer scaled maps are used in local and regional planning to examine the important areas identified in the broad scaled map (Cadman et al., 2010). These tools are used by conservationists to address biodiversity loss, and they need to be proactively used to guide decision-making (Cadman et al., 2010).

2.3 Policy framework for the conservation of South Africa’s biodiversity

Biodiversity conservation is governed by a series of multilateral biodiversity agreements, serving to stop the degradation of the biological resources (Adam, 2008). A significant number of international conventions, treaties and protocols have been signed and ratified by South Africa. The principles of many of these international agreements, such as sustainable use of natural resources, are echoed in many strategies and management plans (DEAT, 2005; Algotsson, 2009). The Multilateral Environmental Agreements’ (MEA) which are related to biodiversity serve to enhance global biodiversity governance, promote synergetic agreements, and harmonise implementation ideally reducing biodiversity loss (Adam, 2008).

2.3.1 International and national policy directives

In South Africa, the founding principles and policy have led to very good environmental legislation extending to biodiversity conservation. South Africa continues to update legislation and a vast amount of South Africa’s environmental legislation is based on, or draws from, international agreements and protocols (DEAT, 2005; Algotsson, 2009). One of the most important international policies to influence SCP was the 1992 Convention on Biological Diversity (CBD). The CBD is regarded as one of the most imperative international legal instruments for supporting and addressing protection of biodiversity worldwide (Mulongoy and Chape, 2004; Mace and Baillie, 2007; Scholes and Biggs, 2005; Berliner et al., 2006).

The CBD’s guiding principles and strategies are implemented in South African through national policies and laws (Kuntonen-van ‘t Riet, 2007; Müller, 2009). As South Africa is a signatory of the CBD, there is an obligation to “...establish and effectively manage a network of PAs that are ecologically representative of the countries biodiversity” (Berliner et al., 2006:1).

The CBD principles are further echoed in much of South Africa’s national legislation. Policy relating to biodiversity in the National Environmental Management: Biodiversity Act No. 10 of 2004 (NEM: BA), Section 52(1) (a) states that “ecosystems that are threatened and in need of protection... may be declared nationally by the Minister, or provincially by a MEC for environmental affairs by notice in the Gazette” (The Republic of South Africa, 2004:42).

The progressive nature of this legislation is determined by the recognition of endangerment and degradation of ecosystems and biodiversity (Pierce et al., 2005). However, the capacity of the South African national, provincial and local governmental departments is challenged by integration of biodiversity into planning (Pierce et al., 2005). South Africa is inundated with a backlog of service delivery, low budgets and lacking capacity and biodiversity conservation holds the least importance (Pierce et al., 2005). Despite the downfalls, South Africa is committed to biodiversity conservation and its environmental legislation is highly acclaimed and recognised as one of the most progressive in the world (Pierce et al., 2005). The legislation is enforced and supported by institutions that ideally uphold the principles of environmental management.

2.3.2 Institutional arrangements and applicable legislation

Institutional arrangements

The national sphere of government's lead agent is the Department of Environmental Affairs (DEA) (Müller, 2009). Although DEA is the lead agent, the environmental functions are spread across a number of different ministries, Department of Water Affairs (DWA), Department of Agriculture, Forestry and Fisheries (DAFF) and Department of Mineral Resources (DMR). There are various parastatal institutions, which aid in environmental governance, including South African National Parks (SANParks) and the South African National Biodiversity Institute (SANBI) (Müller, 2009). The national agencies and departments inform the provincial and local spheres of government, and they essentially are the implementing agencies with regard to environmental governance (Müller, 2009).

The implementation of environmental policies into planning and implementation are key responsibilities of the local and provincial environmental government (Müller, 2009; BSSA, 2009). The provincial environmental departments are often supported by a range of other institutions; tourism, agriculture and conservation that are often governed by separate statutory boards such as EKZNW in KwaZulu-Natal and CapeNature in the Western Cape (Müller, 2009). The provincial authority also has a role to play in ensuring that there is sufficient staff for the maintenance of follow-up support and partnerships between NGOs (BSSA, 2009).

NGOs commonly align with the government policies and plans, complementing and aiding with planning (BSSA, 2009). NGOs are involved in a multitude of different conservation planning approaches (Brooks et al., 2006). Playing an active role in placing pressure on administrative actions guaranteeing that duties are fulfilled is common practice for NGOs. They bring a variety of different skills and tools to conservation and can often be more adaptive (BSSA, 2009).

According to BSSA (2009:10) "In the foreseeable future, NGOs can play a significant gap-filling role where provincial agencies are under-resourced and under-staffed, and can continually motivate for greater political and financial investment in agencies, priority areas and biodiversity-sensitive decision-making". Another

initiative which can aid in filling gaps in conservation biodiversity is the Expanded Public Works Programme (EPWP) which was established in 2003 by the South African government (Kuntonen-van 't Riet, 2007). EPWP is identified as an employment creating initiative in the various social, economic, environmental and infrastructure sectors (Kuntonen-van 't Riet, 2007). The environmental sector which relates to biodiversity includes LandCare, Working for Water (WfW) and Working for Fire (WfF).

According to Nel and Kotzé (2009), achieving good environmental governance is when there is integration of environmental management at all levels and spheres; through policy and planning. The nature of management within South Africa is extremely complex. Issues arise due to fragmentation and the legal underpinnings of South African environmental law prove to have a negative effect on environmental governance and management (Nel and Kotzé, 2009).

Fragmentation occurs as the different organs of state have conflicting environmental governance mandates. The decision-making becomes extremely difficult as it is hindered by policies, processes, authorisations and legislation (Nel and Kotzé, 2009). The DEA does not take full control and lead pertaining to the environmental matters within the country. The DEA simply provides framework guidance and acts more as a coordinator (Nel and Kotzé, 2009). Governmental agencies are notorious for inconsistency and ineffective governance that has a negative effect on environmental governance (Nel and Kotzé, 2009). As outlined, the laws that are applicable to biodiversity management in South Africa are governed by various departments at different levels and integration and co-operation is difficult; nonetheless, South Africa's legislation is some of the most progressive in the world (Kuntonen-van 't Riet, 2007).

Legislative framework

South Africa's Constitution (Act No. 108 of 1996) provides the overall framework for environmental governance in South Africa (DEAT, 2005). The Constitution (Act No. 108 of 1996) states that everyone has a right to a healthy environment, one that is not harmful to their health or well-being, and to have an environment that will be conducive for future generations (The Republic of South Africa, 1996). This relates to issues of pollution prevention, conservation practices and achieving development with economic, social and environmental security. The Constitution governs South Africa's provincial, national and local spheres and co-operation between the various tiers of government is strongly encouraged (DEAT, 2005; Algotsson, 2009).

The Constitution does not specifically refer to biodiversity; however, it does refer to terms such as 'environment', 'nature conservation' and natural resources (The Republic of South Africa, 1996). Although there are various acts that have been promulgated, many of them related specifically to water, forestry, marine resources and national parks, they all serve as tools to protect the biodiversity of the country (DEAT, 2005). The various aspects that many of these acts deal with incorporate biodiversity and the responsibility falls on the state departments (DEAT, 2005).

The National Environmental Management Act 1998 (NEMA) Act 107 of 1998 was the driving force behind many of South Africa's current biodiversity principles. NEMA was instrumental in ensuring people were placed at the forefront of the legislation while making specific allowance for biodiversity. It states that if biodiversity loss cannot be avoided altogether then it should be minimised. Reference is also made to development and how natural resources should be sustainably used, such that the integrity of the resource is not jeopardised (DEAT, 2005). NEMA also pays particular attention to the management and planning for sensitive ecosystems such as wetlands, estuaries and coastal shores (The Republic of South Africa, 1998).

National environmental legislation has been influenced by many governmental papers, one in particular being the White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity, which paved the way for a suite of legislation (DEAT, 2005; Algotsson, 2009). Subsequently, mechanisms were imposed causing consistency in implementing biodiversity policy countrywide (DEAT, 2005).

South Africa has good environmental legislation and the hierarchical nature of the legislation ensures that there is integration of all the policies and plans into a main driving ideology. Ideally all guidelines, policies and plans should be interconnected and inform one another (Figure 2-3).

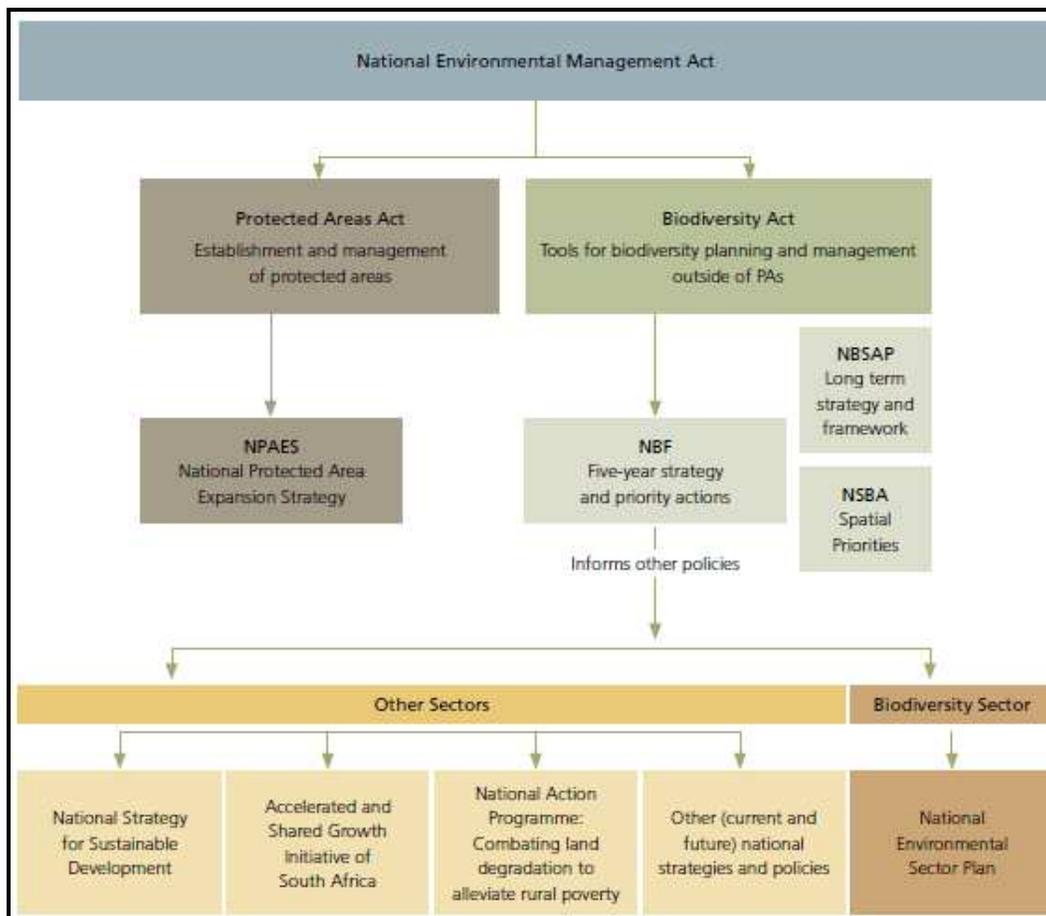


Figure 2-3: A schematic of the hierarchy of the main biodiversity legislation and supporting policies and programmes (Cadman et al., 2010:35)

The biodiversity legislation presented in Figure 2-3 will be examined further below.

2.3.3 National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM: BA)

The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEM: BA) serves to resolve fragmentation that existed between national and provincial levels. This Act provides for management and conservation of biodiversity within the Republic of South Africa (The Republic of South Africa, 2004b). NEM: BA also established the South African National Biodiversity Institute (SANBI) (The Republic of South Africa, 2004b). SANBI was initially only responsible for the expansion of botanical gardens around South Africa, however, its responsibility further shifted to expanding the PA network (DEA and SANBI, 2009).

Subsequent to NEM: BA, many policies and action plans were drafted to ensure several of the clauses set out by the Act were achieved. The National Biodiversity Strategy and Action Plan (NBSAP) was finalised in May 2005. The NBSAP sets out “a comprehensive long-term strategy for the conservation and sustainable use of South Africa’s biodiversity, including medium and long-term targets” (DEAT, 2006: 10).

NBSAP set out five strategic objectives to be achieved over a period of twenty years. One of the first objectives was to integrate biodiversity management into the economy. Secondly, it set out to ensure good governance in the biodiversity sector by enhancing institutional effectiveness and efficiency (DEAT, 2006). Thirdly, terrestrial and aquatic management need to be integrated, reducing threats for biodiversity and enhancing ecosystem services (DEAT, 2006). The fourth strategic objective was to promote the sustainable use of biological resources and sharing of the benefits (DEAT, 2006). The final objective identified the importance of a network of conservation areas that in turn conserves a representative sample of biodiversity and ensures ecological processes are maintained (DEAT, 2006).

To further achieve the policies and plans of NEM: BA, the National Spatial Biodiversity Assessment (NSBA) was published in 2005 and was to be updated every five years (DEAT, 2006). The NSBA spatially identifies the threatened and under-protected ecosystems of South Africa (DEAT, 2006; Driver et al., 2005). The classification scheme of the NSBA is based on the International Union for Conservation Nature (IUCN) categories: critically endangered (CR), endangered (EN), vulnerable (VU) and Least Threatened (LT) species (Figure 2-4) (Driver et al., 2005).

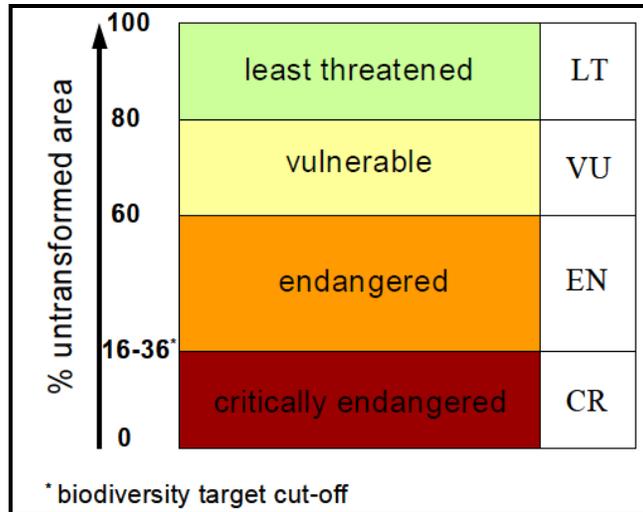


Figure 2-4: Classification of vegetation types into four levels of ecosystem status based on percent of remaining untransformed area and the biodiversity target (Driver et al., 2005:38)

The NSBA uses two principles from the SCP approach to biodiversity conservation. It identified the need to conserve an all-inclusive representative sample and to ensure persistence of the biodiversity over time (DEAT, 2006). Essentially, the NSBA had some key findings. South Africa has a biased PA network and a representative sample of biodiversity was not being conserved (DEAT, 2006). From these deductions, appropriate management of land and natural resources outside PAs, especially in terms of biodiversity conservation is essential (DEAT, 2006).

From the NBSAP and the NSBA immediate priorities were gauged which then informed the National Biodiversity Framework (NBF) (DEAT, 2006). Drafted in 2007, the NBF provides a framework for conservation and development (DEAT, 2006). Paying attention to biodiversity management and addressing responsibilities and roles of the various stakeholders is the focus of the NBF (DEAT, 2006).

Strategic guidelines informing management and development in local municipalities are outlined by the Municipal Systems Act, 2000 (Act No. 32 of 2000) and the Integrated Development Plans (IDPs) (Kuntonen-van 't Riet, 2007). The spatial extension of the IDP is the Spatial Development Framework (SDF). In terms of NEMBA, the IDPs should be aligned with bioregional plans and the NBF (Kuntonen-van 't Riet, 2007; Pierce et al., 2005).

Gauteng, KwaZulu-Natal, Western Cape and Mpumalanga have developed extensive Conservation Plans, which is a direct extension of the NSBA and the NBSAP (Kuntonen-van 't Riet, 2007). These plans provide the cornerstone for sustainable development and the biodiversity conservation strategy aimed at informing the SDF/IDP (Kuntonen-van 't Riet, 2007) (See Figure 2-3).

NEM: BA is at the forefront of developing a number of different tools, policies and guidelines to ensure the protection of biodiversity. NEM: BA and National Environmental Management: Protected Areas Act 2003 (Act 57 of 2003) (NEM: PAA) should be considered together as they both have the same underlying principles and goals of biodiversity conservation. NEM: BA is used for the protection of biodiversity outside of PAs and NEM: PAA is extensively used in protecting and managing biodiversity within PAs.

2.3.4 National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEM: PAA)

The main purpose of National Environmental Management: Protected Areas Act 2003 (Act 57 of 2003) (NEM: PAA) is to provide legislative representation for the protection and conservation of biodiversity within South Africa.

NEM: PAA outlines the different kinds of PAs: Special Nature Reserves, National Parks, Nature Reserves and Protected Environments (DEAT, 2009). Each of the four protected areas have differing objectives, management authorities, restrictions and legality of withdrawal, these are outlined in Table 2-1 below.

Table 2-1: Summary of the legal characteristics of the four protected areas defined in the NEM: PAA (DEAT, 2009:13)

Special nature reserve	<p>Objective: To protect highly sensitive, outstanding ecosystems, species or geological or physical features in the area. To make the area primarily available for scientific research or environmental monitoring.</p> <p>Management authority: Designated by the Minister in terms of an approved Management Plan that may include co-management agreements.</p> <p>Use restrictions: Strict access restrictions that include aircraft restrictions. No mining. No commercial activities specifically provided for. Additional restrictions may be imposed by management authority.</p> <p>Withdrawal: Requires resolution of Parliament.</p>
National park	<p>Objective: To protect an area that is of national or international biodiversity importance; or which contains a viable, representative sample of South Africa's natural systems, scenic areas or cultural heritage sites; or that protects the ecological integrity of one or more ecosystems in the area.</p> <p>Management authority: South African National Parks (SANParks) or any other management authority assigned by the Minister.</p> <p>Use restrictions: Access restriction. No mining. Aircraft restrictions. Commercial activities subject to certain requirements being met. Additional management authority imposed restrictions.</p> <p>Withdrawal: Requires resolution of Parliament, unless landowner withdraws from contractual agreement.</p>
Nature reserve	<p>Objective: To protect an area that has significant natural features or biodiversity; that is of scientific, cultural, historical or archaeological interest; that is in need of long-term protection for the maintenance of biodiversity; or for the provision of environmental goods or services.</p> <p>Management authority: Management authority designated by the MEC in terms of approved Management Plan. Co-management agreements may be entered into.</p>

	<p>Use restrictions: Access restriction. No mining. Commercial activities subject to certain requirements being met. Additional management authority imposed restrictions.</p> <p>Withdrawal: Requires resolution of Parliament or Provincial Legislature, unless landowner withdraws from contractual agreement.</p>
Protected environment	<p>Objective: To protect an area or ecosystem that is outside of a special nature reserve, national park, world heritage site or nature reserve and is sensitive to development due to its biological diversity; natural characteristics; scientific, cultural, historical, archaeological or geological value; scenic and landscape value; or provision of environmental goods and services.</p> <p>Management authority: Management authority may be designated by the MEC or Minister.</p> <p>Use restrictions: No mining without Minister and Minister of Minerals and Energy's consent. Restrictions may be gazetted.</p> <p>Withdrawal: By notice in relevant government (provincial or national).</p>

PAs serve to protect biodiversity in ecologically viable areas and representation of all ecosystems and habitats ensures the ecological integrity of the PA (The Republic of South Africa, 2003). The Act sets out to conserve ecologically sensitive areas as well as vulnerable, threatened or rare species (The Republic of South Africa, 2003). NEM: PAA further addresses goods and services, sustainable use of biological resources and the promotion of tourism (The Republic of South Africa, 2003).

2.3.5 Managing biodiversity inside protected areas

Protected Areas (PAs) are at the forefront of all national and regional biodiversity conservation strategies (Mulongoy and Chape, 2004). PAs are a valid, measurable indicator of progress in conserving biodiversity (Chape et al., 2005:450). The importance of PAs has long been recognised (Chape et al., 2005).

Although PAs are pivotal in conserving biodiversity, it is argued by Chape et al., (2005) that the number and extent of PAs may only provide a superficial indication of the political commitment. It is not clear from purely looking at area whether conservation objectives are being reached by the PAs (Chape et al., 2005). To assess the reaching of conservation objectives one needs to assess the 'effectiveness of coverage' (Chape et al., 2005). It is assumed that once an area is protected it is a permanent feature, and for the near future, it will be protected. PAs are thought to protect 100% of the biodiversity features, meaning that the biodiversity target for the vegetation or species are assumed to have been met (Driver et al., 2005). However, Rodrigues, Andelman, Bakarr, Boitani, Brooks, Cowling, Fishpool, da Fonseca, Gaston and Hoffmann (2004) conclude that worldwide the representation of biodiversity within the PAs is unknown. PAs are sometimes perceived as 'paper parks' and due to their design or poor location they simply cannot function properly (Mulongoy and Chape, 2004). It is then argued that if PAs are to be used as biodiversity indicators, their design and location should be optimal (Rodrigues et al., 2004).

PAs are not static and the threats which they are exposed to need to be managed. Some of the major threats to PAs include, infringement by human settlement, the removal of important elements or keystone species to

the ecosystem, agricultural conversion, damage to the ecology due to poor management, pollution from external sources, fire, poor catchment management and overgrazing (Mulongoy and Chape, 2004).

One of the most long-term threatening aspects to PAs is their isolation, species are unable to migrate and genetically species are limited (Rodrigues, et al., 2004; Dudley et. al, 2005). Isolated PAs are usually surrounded by radically altered land, and unless the area is large enough the species within that area will be threatened (Dudley et. al, 2005). Thus, connectivity and buffer zones with regard to PAs are largely accepted in the conservation community (Dudley et. al, 2005). This is one of the goals of SCP, and arguably one of the most important ones especially with regard to climate change and allowing migrating of species.

“PAs also only function effectively as tools for conservation if they are well managed and they retain their constituent species and habitats” (Dudley et al., 2005:458). Many PAs worldwide and in South Africa are under threat or are experiencing degradation through poor management (Dudley et al., 2005). The management effectiveness of PAs is seldom evaluated; this causes scepticism amongst funding agents, politicians and policy makers (Parrish, Braun and Unnasch, 2003).

Despite the heavy reliance on PAs, there is a substantial gap in the PA network in South Africa (Driver et al., 2005). PAs are central to the future of biodiversity, however, they are not adequately meeting their potential as they are too small, too few, unconnected and maintenance and administration is costly (Ehrlich and Pringle, 2008).

To evaluate how well ecosystems are being protected, SANBI has developed a guide based on a percentage how much of the target has been conserved (Table 2-2). This enables an evaluation of ecosystems that may need specific attention.

Table 2-2: SANBI conservation status categories (Driver et al., 2005)

Conservation status	Criterion
Not protected	0% of target conserved
Hardly protected	0-<5% of target conserved
Poorly protected	5-><50% of target conserved
Moderately protected	>50-<100% of target conserved
Well protected	100% of target conserved

Most ecosystems in South Africa are not sufficiently conserved (Driver et al., 2005). To bridge the gap of the inadequate protection of ecosystems, the PA network needs to be expanded.

2.3.6 National Protected Area Expansion Strategy

South Africa’s current PA network falls short in sufficiently sustaining biodiversity and ecological processes thus mechanisms such as the National Protected Area Expansion Strategy (NPAES) are required (The

Republic of South Africa, 2010). The primary goal “is to achieve cost effective protected area expansion for ecological sustainability and adaptation to climate change” (DEA & SANBI, 2009:7). It is the responsibility of the provincial conservation body to develop their own specific PA expansion, and to play a role in the monitoring and implementation of the NPAES (The Republic of South Africa, 2010). The implementation of the NPAES is undertaken by provincial conservation authorities, SANParks and World Heritage Site Authorities, they are also supported by other organisations and NGOs (The Republic of South Africa, 2010).

Approximately 6, 5% of the land surface area of South Africa is PAs. The fifteen-year PA target identified in the NBSAP was 12% of terrestrial areas; this is a starting point for the more ecosystem specific targets. The terrestrial target then informs targets for vegetation groups and biome levels (DEA and SANBI, 2009a).

The provinces’ PA and requirements for reaching targets are outlined (Table 2-3). Mpumalanga, the Western Cape, Limpopo and KwaZulu-Natal have the highest percentage of PAs. The Free State and North West have extremely low percentages under PAs.

Table 2-3: Land based protected area targets for each province in South Africa (The Republic of South Africa, 2010:20)

Province	Province Area	20-year PA target	Current Protected Areas	
	(ha)	(%)	(ha)	(%)
Eastern Cape	16893000	12	687000	4.1
Free State	12983000	13	167000	1.3
Gauteng	1655000	13	84000	5.1
KwaZulu-Natal	9333000	13	731000	7.8
Limpopo	12575000	11	1489000	11.8
Mpumalanga	7649000	13	1168000	15.3
North West	10651000	11	199000	1.9
Northern Cape	37289000	11	1582000	4.2
Western Cape	12945000	13	1632000	12.6

Spatial analysis is imperative for identifying priority areas for expansion. For the NPAES, the PA layer reflected the most up to date data on PAs from all provincial agencies (DEA and SANBI, 2009). The fragmentation and transformation layers were used to identify the areas that had not been irreversibly transformed by human activity (DEA and SANBI, 2009).

There exists a direct correlation between the option to expand the PA and the degree of the competing land resource or uses. The price of the land correlates with competing land uses such as cultivation, mining or urban expansion, and land price will be higher if it has economic potential (The Republic of South Africa,

2010). The above-mentioned problem is usually the case for biomes such as Grasslands and Fynbos and other land uses appear to be more profitable.

PA expansion has to integrate multiple aspects the socio-economic development being one of them. Rural development and local economic development have huge potential in PA expansion, benefitting the surrounding communities and becoming attractive for investments and tourism opportunities. (The Republic of South Africa, 2010; Jackelman et al., 2007). According to The Republic of South Africa (2010), there has been little research into the potential of land reform and PA expansion. There is an opportunity for the two to support one another "...for example through contract agreements which establish nature reserves or other forms of biodiversity stewardship agreement on land that remains in the hands of its owners rather than being transferred to a protected area agency" (The Republic of South Africa, 2010:2). The position of the South African cabinet on land restitution claims within protected areas addresses various aspects. The title to the land within a PA is transferred to the claimant but it is stipulated that there is no physical occupation of land claimants within protected areas (EKZNW, 2009b). Furthermore, the land is to be solely used and maintained for conservation purposes and activities. The continued management of the PA is still the responsibility of the state conservation authority and it is governed by legislation and management plans (EKZNW, 2009b).

As outlined, cost of land is high and funding for the expansion of PAs is one of the many hindrances. Government funding is relied upon heavily; however, some funding may come from income from tourism, for example, entities such as EKZNW, CapeNature and MTPA get income from entrance, recreation, harvesting and accommodation. Game sales are also a major funding tool, especially for entities such as SANParks (DEA and SANBI, 2009a). Financial assistance may also come from NGOs and donor funding, and the pooling of resources in South Africa is becoming more common as most entities have the same common goal (DEA and SANBI, 2009a).

There are three main mechanisms for the PA expansion. Acquisition of land for PAs can be done by land donations, land purchase, land leasing and land expropriation. According to SANBI, (2009b) fears of nationalisation among white farmers has caused widespread concern. If the regulations in terms of the Constitution amount to land expropriation then full compensation must be paid out (The Republic of South Africa. 1996). Land expropriation is unlikely as while the Constitution provides redistributive land reform it also provides for the protection of property rights (The Republic of South Africa. 1996).

Negotiation of contract agreements with landowners is another mechanism and this includes biodiversity stewardship. Biodiversity stewardship is seen as a proactive approach that allows for the facilitation, support and implementation of biodiversity management practices (DEA and SANBI, 2009a). Biodiversity stewardship plays an essential role to the NPAES and the achievement of South Africa's targets, and it can play a role in the securing of threatened ecosystems (BSSA, 2009; McCann, 2011). Biodiversity stewardship is seen as a cost effective way for the government to secure land for conservation, and, since the

implementation of biodiversity stewardship, it has been seen as a key mechanism for the securing of land outside of state owned land (BSSA, 2009).

The NPAES is extensive and aims to conserve areas of high biodiversity aiding in reaching important targets; however, protection of all areas will not reach all targets. Resultantly, there is a need for policy and mechanisms that will ensure the persistence of biodiversity outside of PAs and these will be examined below.

2.3.7 Conservation of critical biodiversity outside of protected areas

According to Gallo, Pasquini, Reyers and Cowling (2009), the foundation for biodiversity conservation in many countries of the world are the formal PAs, however, these PAs fall short of reaching the targets and goals of biodiversity conservation. Although PAs are pivotal for conservation strategies, it has been realised that strict protection alone will not secure the world's biodiversity (Pierce et al., 2005). Dudley et al. (2005) argue that most of the world's biodiversity exists outside of PAs and only 11 % of the Earth's surface falls under a PA. This then means that approximately 90% of the world's land surface remains outside of PAs (Dudley et al., 2005; Cousins, Sadler and Evans, 2008). Both sustainable use and further expansion of PAs should be considered (Dudley et al., 2005).

Worldwide and in South Africa, having a network of PAs is not enough to conserve biodiversity. As discussed, the PAs are often not representing biodiversity fully and they simply cannot serve as surrogates (Dudley et al., 2005). Furthermore conservation bias needs to be addressed as certain ecosystems such as the forest, fynbos and desert biome fall under more of the PAs than grasslands or the Nama-Karoo ecosystems (Driver et al., 2005).

PAs are not the only mechanism for biodiversity conservation in South Africa. A suite of legal tools are identified by NEM: BA, which includes bioregional plans, National Biodiversity Framework (NBF), alien invasive initiatives, Biodiversity Management Plans (BMPs), mainstreaming biodiversity into production sectors and listing of threatened and endangered ecosystems, these tools can complement the PA networks (The Republic of South Africa, 2010). As discussed, bioregional plans can identify critical biodiversity areas at local scale, decision making and land-use planning for these areas can then be undertaken at a finer scale (Reeves and Marom, 2009). The NBF aims at sustainable use of resources managed by both governmental and non-governmental organisations (Reeves and Marom, 2009).

The Biodiversity Management Plans can be designed for species of specific concern such as migratory species of threatened and endangered species (Reeves and Marom, 2009). The listing of species that are threatened and endangered brings attention to species that need protection. The IUCN Red List of Threatened Species (henceforth 'Red list') is a list compiled which identifies Near Threatened (NT), Vulnerable (V), Endangered (E) and Critically Endangered species based on various criterion outlined below (Table 2-4). Critically Endangered (CE) species that are decreasing in number, have small ranges, and are

nearing extinction will be of high priority when considering conservation strategies (Table 2-4). The listing of threatened and endangered species is a key mechanism used in conserving biodiversity outside of PAs.

Table 2-4: Summary of IUCN Red list categories and their thresholds (IUCN, 2011; Hodgetts, 2000: 295)

Criterion	IUCN Red list Categories			
	Critically Endangered (CE)	Endangered (EN)	Vulnerable (VU)	Near Threatened (NT)
Rapid decline	> 80% over 10 yrs	> 50% over 10 yrs	> 20% over 10 yrs	Does not qualify for criteria
Small range (fragmented, declining or fluctuating)	extent of occurrence <100km ² or area of occupancy <10 km ²	extent of occurrence <5000km ² or area of occupancy <500 km ²	extent of occurrence <20000km ² or area of occupancy <2000 km ²	Does not qualify for criteria
Small population and declining	<250 mature individuals, population declining	<2500 mature individuals, population declining	<10000 mature individuals, population declining	Does not qualify for criteria
Probability of extinction	>50% within 5 years	>20% within 20 years	>10% within 100 years	Does not qualify for criteria

There is an ongoing argument about whether areas should be protected or if there should be sustainable use. Addressing sustainability, mainstreaming of conservation into policies and practices of these sectors needs to be accomplished. “If biodiversity is to be conserved outside PA networks, in economically productive landscapes, this implies that biodiversity use is sustainable in the overall landscape and in addition that management is compatible with the survival of some or all of the biodiversity originally present” (Dudley et al., 2005:458).

2.3.8 Mainstreaming conservation into production sectors

The mainstreaming of biodiversity conservation with other land uses needs to be incorporated into planning as many of the biomes support a multitude of different land uses, many of which have a marked impact on the biodiversity integrity (O’Connor, Martindale, Morris, Short, Witkowski and Scott-Shaw, 2011). Thus, it is agreed that the burden of biodiversity conservation will rely on other sectors such as agriculture, forestry, mining and land-use planning (Pierce et al., 2005). To ensure further protection of biodiversity in productive sectors, conservation plans should be mainstreamed. Ideally mainstreaming of the conservation plans should be incorporated into policies and decision-making. Stakeholders should be consulted on a continuous basis to

ensure a participatory nature (Knight et al., 2006). Individuals and organisations that form effective partnerships between the sectors are committed and vital for successful mainstreaming (Knight et al., 2006).

An important biome which mainstreaming should be incorporated into is the grassland biome, as it is extensively used and is poorly conserved (O'Connor et al, 2009). For example, to protect the Blue Swallow (*Hirundo atrocaerule*), their habitat (grasslands) should be protected and the Blue Swallow conservation efforts should be integrated into broad conservation initiatives and planning. Sites need to be secured in perpetuity to ensure the persistence of the species such as the Blue Swallow. It was further suggested that tax reductions, incentives or stewardship type approaches should be employed to protect the habitat and consequently the Blue Swallow (Wakelin and Hill, 2007). “Conservation cannot work in isolation, just as we now recognise the importance of ecosystem and habitat conservation as a holistic approach we need to recognise that conservation can only succeed through the involvement of all stakeholders, conservation bodies, commercial farmers or surrounding rural communities” (Wakelin and Hill, 2005:255).

A notable issue regarding mainstreaming biodiversity into the production sector is the issue with land use planning; often there is a lack of infiltration. The stakeholders are ultimately the ones who inherit the plans. However, the stakeholders such as government officials and landowners are not considered during the planning process (Pierce et al., 2005). Infiltration and integration of many of the SCP assessments with land use planning is difficult as goals and output projections have little value for land use planners (Pierce et al., 2005). Additionally, the planning units used in conservation plans are often arbitrary units; these grid cells make integration more difficult for land-use planning who require actual land management units (Pierce et al., 2005).

The tools that are outlined and governed by NEM: BA are important for conservation of biodiversity outside of formal PAs; other initiatives that contribute to conservation outside of formal PAs include informal conservation areas (ICAs) (Jackelman et al., 2007; Rissman, Lozier, Comendant, Kareiva, Kiesecker, Shaw and Merenlender, 2007).

2.3.9 Informal conservation areas

There are numerous ICAs (Table 2-5): non-statutory private nature reserves, which many private game farms function as; biodiversity corridor reserves such as Garden Route Initiative; National Heritage sites and bird sanctuaries, to name a few. Arguably, ICAs may contribute to conservation targets and secure biodiversity; however, they do not meet the national definition of a formal PA in terms of the legislation (Jackelman et al., 2007).

Table 2-5: Conservation areas under some form of conservation management/tenure (DEA and SANBI, 2009a:22).

Biosphere Reserve (in terms of UNESCO's Man and the Biosphere Program)
Non-statutory Private Nature Reserve
"Mega-Reserve" initiatives (e.g. Baviaanskloof Mega-Reserve) and biodiversity corridor initiatives (e.g. Greater Cederberg Biodiversity Corridor, Garden Route Initiative)
National Heritage Site
Bird Sanctuary
Community Conservation Area
"Headman's Forest"
Voluntary conservation area
Special Management Area
Sectoral (e.g. wine) "partner", "member" or "champion" sites (or equivalent)
Non-statutory Wilderness Areas
Estuary Protected/Conservation Area or Estuary Management Area

These ICAs were not utilised in the PA expansion strategy, although they can play an important role in biodiversity conservation, there generally is a lack in effective mechanisms to guarantee that successful management systems are in place to protect biodiversity (Jackelman et al., 2007; DEA and SANBI, 2009a). The long-term persistence and security of these ICAs is also questionable. Another limitation of ICAs is the extremely poor database (DEA and SANBI, 2009a). Although there are no legal guarantees, in the research conducted by Biggs et al. (2006), it is suggested that areas that do not fall under the formal PA network still play an intricate role in the maintenance of biodiversity within South Africa.

The strengthening of the ICAs is examined by Gallo et al. (2009) and previous studies indicate that ICAs in conjunction with PAs would save the state costs in acquisition of new land. According to Gallo et al. (2009), ICAs are often not considered in conservation statistics or in national planning, as there is limited academic research on them. Gallo et al. (2009) identify the fact that the ICAs do contribute, as private landowners show capacity and willingness regarding conservation of millions of hectares. Conservation of land does not necessarily translate into biodiversity conservation; however, the indirect benefits may include buffering PAs, and creating contiguity in the landscape (Gallo et al., 2009; Jackelman et al., 2007). A study conducted by Gallo et al. (2009) in the Eastern Cape found that ICAs played an integral role in protection of biodiversity and ICAs were found to represent the more threatened habitats and conserve twice as much land as the PAs.

The acquirement of PAs in many areas of South Africa is expensive due to high acquisition and management costs, and the land is often in undesirable areas and fragmented from main PAs (Gallo et al., 2009). Thus, ICAs are further identified as being important as the amount of area conserved is increased, and a wider

range of habitats are conserved and often habitats that are more endangered are conserved (Gallo et al., 2009).

Although the validity of ICAs is often queried, unregistered ICAs are likely to operate over a long period of time (Gallo et al., 2009). These ICAs also have conservation management plans that have been formalised and goals identified, and they are strongly driven by conservation motives. Although some of the ICAs may be degraded in some way, the ecological processes are maintained and they may return to a pristine state if managed correctly (Gallo et al., 2009).

Moderate land use within ICAs forms the basis of a major argument surrounding the grazing of ungulates such as cattle and sheep (Table 2-6). It was suggested that if they were stocked within grazing norms, then the biodiversity intactness would be sustained to a suitable conservation level (Biggs et al., 2006). Rangelands defined as a moderate land use could become degraded if not managed correctly, thus making the moderate land use significantly important for conservation (Biggs et al., 2006). These areas should then be addressed in conservation planning especially with the notion of sustainable use of resources (Biggs et al., 2006).

Table 2-6: Land use classes and their description (Modified from Biggs et al., 2006:279)

Land-use Class	Description	Examples
Protected	Minimal recent human impact on structure, composition or function of the ecosystem. Biotic populations inferred to be near their potential	Large protected areas, national, provincial and private nature reserves, wilderness areas and mountain catchments
Moderate use	Extractive use of populations and associated disturbance, but not enough to cause continuing or irreversible declines in populations. Processes, communities and population largely intact	Grasslands grazed within their sustainable carrying capacity, forest areas harvested within their regenerative capacity.
Degraded	Extractive use at a rate exceeding replenishment and widespread disturbance. Often associated with high human population densities and poverty in rural areas. Productive capacity reduced to approximately 60% of natural state.	Area subject to intensive harvesting, grazing, hunting or fishing, areas invaded by alien vegetation.

The persistence of ICAs in the future is of concern for conservation planners; however Gallo et al. (2009) argue that policies and mechanisms need to be explored to strengthen ICA persistence. “In the Little Karoo, it appears that the most effective and low cost treatments would be to publicly recognise the stewards as valued managers of the landscape while also paying personnel knowledgeable about agriculture, ecology, and conservation to assist the stewards on a needs-be basis” (Gallo et al., 2009:452).

A mechanism for conservation implementation, both inside and outside formal PAs, is biodiversity stewardship. “Contract agreements with landowners/users, usually developed through biodiversity stewardship programmes, are identified in the NPAES as a key mechanism for expanding the protected area network” (DEA and SANBI, 2009a: x). Land acquisition for conservation is very expensive and biodiversity stewardship is a cost effective alternative as landowners commit to conservation and take management into their own hands (Purnell, 2008; Ferrar and Lötter, 2007). Prior to stewardship, most formal conservation efforts lie with the state, the province or municipalities. Biodiversity stewardship is a very powerful tool that can be used to assist national and provincial government in securing biodiversity outside of formally PAs (Purnell, 2008).

2.4 Stewardship

Stewardship pertains to the sustainable use of resources (Rossouw, 2012). Generally, stewardship relates to agricultural practices (Rossouw, 2012). Farmers worldwide are stewards and have a deep appreciation and awareness of their land; however farmers are also known for misusing the land (Ahnström, Höckert, Bergea, Francis, Skelton and Hallgren, 2009). Claiming to be good stewards, many farmers in the USA declare they sustainably use their land (Ahnström et al., 2009). In the UK, conservation farming practices have shifted to a more conservation based approach leading to increased awareness of important species. In raising awareness about important species, more conservation minded decisions are being taken (Ahnström et al., 2009).

While the UK and the USA do not have an active ‘stewardship’ programme, a wide range of tools for conservation are offered; subsidised management, public-private restrictions, achievement recognition and environmental education (Rossouw, 2012). “Specific stewardship tools vary according to social, legal, institutional and ecological constraints however all operate to encourage and enable responsible management” (Rossouw, 2012:21). These tools are either regulatory or voluntary methods of achieving biodiversity conservation (Rossouw, 2012). Anyone can proclaim their land as a protected area (Rossouw, 2012). In the countries such as the USA, Australia and New Zealand, farmers and landowners are encouraged to follow conservation farming practices by the national and local government (Ahnström et al., 2009). Enticing farmers to apply conservation farming techniques to their land requires the incorporation of the broader conservation goals into the goals of the farm (Ahnström et al., 2009). Realistic goals should be adopted, as often there is mistrust between farmers and commercial experts (Ahnström et al., 2009). Greater conservation success is obtained if there is a positive attitude towards the approach (Ahnström et al., 2009).

In Australia an active stewardship programme has been formed, a number of different systems have been developed to encourage ‘stewardship’ (Port Phillip and Westernport Catchment Management Authority (PWCMA), 2007). Landowners in Australia have a strong sense of stewardship and will to practise conservation farming techniques. The Australian government is developing strategies, which reward sensible and sustainable land stewardship practice. To achieve this there are agricultural extension improvements,

encouragement of strong partnerships between stakeholders and offering of tangible benefits (PWCMA, 2007).

Worldwide the stewardship approach is becoming more popular, the biodiversity stewardship programme of South Africa is gaining momentum as a credible tool to implement biodiversity conservation (Rossouw, 2012). The legislature and guiding process of stewardship is described below.

2.5 Biodiversity stewardship in South Africa

As discussed previously, South Africa has a rich biodiversity and it is under threat. Most valuable biodiversity is on private owned land or communal land, consequently conservation efforts should be expanded to include areas outside of the formal PA network (BSSA, 2009; Botha, Martens and Winter, 2006). Biodiversity stewardship was developed with the primary goal to secure biodiversity features under voluntary agreements with private and communal landowners (BSSA, 2009).

Stewardship initially started in the Western Cape, where the conservation authority CapeNature officially launched the Conservation Stewardship Programme in 2003 (Botha, Martens, and Winter, 2006:24; EKZNW, 2010a). Later, the Biodiversity Stewardship South Africa (BSSA) initiative was formulated during a non-governmental exploratory workshop. Drawing from the experiences of the Western Cape and KZN, the structure of BSSA was formulated by a number of different representatives including BotSoc, EWT, WWF, the Maloti Drakensberg Transfrontier Project and the DEA (EKZNW, 2009).

According to Ezemvelo KwaZulu-Natal Wildlife (EKZNW) (2009), Botha et al., (2006:24) and Abdur-Raheem (2010:25), stewardship means “the wise use, management and protection of that which has been entrusted to you as a landowner or is rightfully yours”. Biodiversity stewardship is the voluntary process whereby landowners or land users agree to participate in biodiversity conservation (Jackelman et al., 2007; EKZNW, 2010a; Harrison, n.d; BSSA, 2009). Stewardship is a proactive approach to achieving conservation goals (EKZNW, 2009). The choice to conserve may fulfil either the protection of important ecosystems, the promotion of sustainable use of natural resources or the management of threats to natural environments and biodiversity (Jackelman et al., 2007; DEA and SANBI, 2009a; Ferrar and Lötter, 2007).

2.5.1 Characteristics and principles of biodiversity stewardship

Biodiversity stewardship is appealing as it is a successful conservation implementation tool on private land; it is target specific and forms an integral part of SCP (Reeves and Marom, 2009). “One of the critical aspects of biodiversity stewardship is to improve and build on the existing capacity of landowners to become stewards of the land with the objective of conserving the elements of biodiversity occurring and indeed the broader ecosystem” (Morris, 2011: 13). Formal commitment is required by the landowner and commitment varies according to different categories which are underpinned by national legislation (Reeves and Marom, 2009; EKZNW, 2010a; Harrison, n.d). The management of the conservation area under biodiversity

stewardship is clearly outlined and support and tangible benefits are available to the landowner (Reeves and Marom, 2009; BSSA, 2009; EKZNW, 2009).

Legally, the developments in legislature of South Africa allow private landowners to declare their land as a PA. The land does not have to adjoin a current PA and the declaration can be warranted by biodiversity value; furthermore, the sustainable use of resources within the PAs is encouraged (Reeves and Marom, 2009; EKZNW, 2009). Biodiversity stewardship gives legal standing for the property of landowners serious about a permanent conservation status (Botha et al., 2006). Biodiversity stewardship is unique in the sense that while they take responsibility of conservation in their own hands, they are aided by the provincial body to take the right steps in ensuring the protection of sensitive ecosystems (EKZNW, 2009; Mpumalanga Tourism and Parks Agency (MTPA), 2009).

As biodiversity conservation is one of the main objectives, when sites are selected they are selected on the sites' biodiversity merit and not on political, economic or ownership status (BSSA, 2009; Reeves and Marom, 2009; MTPA, 2009). To make best use of resources and energy, biodiversity targets are mostly based on spatial priorities (EKZNW, 2009).

Ongoing support for the landowner ensuring sufficient capacity and resources is a fundamental principle of biodiversity stewardship. Landowners' needs and perspectives are considered and supported. Although landowners are required to make a commitment to guarantee ongoing conservation, their commitment to the biodiversity stewardship is voluntary. To ensure commitment, the motivations for conservation by the landowner are identified, this also aids in determining the best way forward in terms of management (BSSA, 2009; Reeves and Marom, 2009; MTPA, 2009). What makes this process so attractive to landowners is that if they enter into these agreements, they are supported by government.

2.5.2 Roles and responsibilities in biodiversity stewardship

The biodiversity stewardship process involves a number of different role players. The lead agents are DEA, the provincial conservation authorities, the landowners, NGOs and SANBI (BSSA, 2009). Co-operative governance is promoted in biodiversity stewardship as the conservation body will not be acting in isolation and a variety of different stakeholders will be involved (BSSA, 2009; MTPA, 2009). According to BSSA (2009) the biodiversity stewardship programme is still an evolving process, and there needs to be coherency between national and provincial frameworks. Clear policies and norms and standards need to be established with the allowance of flexibility between the different provinces (BSSA, 2009). The roles and responsibilities of the implementing agencies in biodiversity stewardship include the building of relationships between landowners, local authorities, governmental departments and NGOs.

The responsibility of DEA includes co-ordination of human resources, making funding available to the implementing agencies and building political support (EKZNW, 2009; Olivier, 2011). DEA should provide guidance and co-ordination for the provincial authorities so that the standard of biodiversity is maintained.

DEA should also play an enabling role in terms of national frameworks, legislation and regulations. It should further aid landowners who commit their property to conservation by promoting the provision of incentives (BSSA, 2009). DEA can also play an active role in initiating NGOs to get involved in biodiversity stewardship.

NGOs frequently take the responsibility of being the broker and mediator for the conservation agreements between the conservation agencies and the landowners (BSSA, 2009). Moreover, NGOs play a major role in incentives and support for biodiversity stewardship landowners (BSSA, 2009). World Wildlife Fund (WWF) and Climate Action Partnership (CAP) have and continue to support policy frameworks and guidelines for DEA and SANBI, specifically for biodiversity stewardship and PAE (Bourne, 2011). WWF plays both a strategic and technical supporting role, and special interest has been applied to the grasslands component in the biodiversity stewardship programme (WWF, 2009). Good cooperative governance between the relevant stakeholders renders a very successful programme (EKZMW, 2009).

According to BSSA (2009), the dedication of staff at provincial and national level must be ensured. Norms and standards should also be practised as often inaction and inconsistency leads to the disillusion and frustration of landowners (BSSA, 2009). A limitation with biodiversity stewardship is bureaucracy, often causing major blockages and hindering swift and efficient processes. Bureaucracy sustains inefficiency through processes, procedures and systems that delay product and service delivery (Meyer, 2007). Bureaucracy can be characterised by over-regulation and control, South Africa governmental departments and organisations are notorious for bureaucracy (Meyer, 2007). Bureaucracy is prominent in the environmental sector in South Africa; this is due to the relatively new environmental laws and the interpretation of them, and the regulatory constraints have negative effects especially in terms of time delays (Meyer, 2007).

Despite the limitations in terms of bureaucracy, the environmental legislation guiding biodiversity stewardship is one of its key strengths making it a viable programme for conservation of biodiversity.

2.5.3 National legislation and policy guiding biodiversity stewardship

According to EKZMW (2009: web page), “the BSSA is an umbrella programme that provides a powerful new tool to assist national and provincial government in fulfilling its mandate to conserve biodiversity outside of state-owned PAs, in terms of the National Environmental Management: Protected Areas (Act 57 of 2003) and Biodiversity (Act 10 of 2004) Acts”. In terms of the NEM: PAA, a platform is created for biodiversity stewardship, legal cooperation and the legal framework outlined by NEM: PAA allows landowners to declare and manage their land as a PA. Biodiversity stewardship is guided and governed by the two categories as outlined by NEM: PAA: Nature Reserve and Protected Environment (Reeves and Marom, 2009). NEM: BA also provides for planning tools and guidelines that assist provincial authorities to identify and address biodiversity priority areas. The fundamental building block for biodiversity

conservation is legislation, although additional actions and implementation need to be supplemented (EZKNW, 2008; Reeves and Marom, 2009). NEM: BA's suite of tools (bioregional plans, NBF, alien invasive initiatives and IEM) are supported by the biodiversity stewardship programme. Biodiversity stewardship serves to help meet targets that were set out in the NBF and NPAES (Reeves and Marom, 2009).

In terms of the Municipal Property Rates Act, 2004 (Act 6 of 2004) provisions are made for compensation for landowners who conserve their properties; this is done through the participation in formal agreements, in which some of the biodiversity stewardship categories fall (The Republic of South Africa, 2004a). Thus, Nature Reserves and national parks that are declared in terms of Section 23 of NEM: PAA that are not "developed or used for commercial, business, agricultural or residential purposes" are, in terms of the act, excluded from paying property rates (Section 17.1 (e) Municipal Property Rates Act, Act 6 of 2004:30). If a private landowner withdraws from the agreement in terms of NEM: PAA the full property rates that the property was excluded from are owed and payable to the municipality concerned (Section 17.2 (a) Municipal Property Rates Act, Act 6 of 2004:30). The Municipal Property Rates Act, Act 6 of 2004 makes provisions for the considerations of rebates or rate exemptions of landowners who enter into a Biodiversity Management Agreement or Protected Environment agreements (Reeves and Marom, 2009).

The Income Tax Act (Act 58 of 1962) and the Revenue Laws Amendment Act (Act 60 of 2008) allow for tax incentives for landowners who are in agreement or contracted to Nature Reserves, Protected Environments or Biodiversity Management Agreements (The Republic of South Africa, 2008). The tax incentives for biodiversity conservation were only proposed in the Revenue Laws Amendment Act (Act 60 of 2008), mainly introduced to encourage biodiversity conservation by private landowners. Landowners, in terms of Income Tax Act paragraph 12(1), are able to claim a deduction on the capital expenditure incurred for the prevention of soil erosion and eradication of noxious plants. Secondly, under the amendment, if a landowner is to develop an approved conservation management plan, the deductions are attainable in terms of tax (The Government of the Republic of South, 2008).

The conservation management plan is facilitated in terms of the NEM: BA and NEM: PAA, and is aimed at promoting biodiversity conservation on private land (Van Wyk, 2010:66). The Revenue Laws Amendment Act 2008 makes allocations for donations, where a property is declared in terms of NEM: PAA as a Nature Reserve it is considered to be donated to a parastatal conservation authority and thus it qualifies for a income tax deduction in terms of section 18A of the Income Tax Act 58 of 1962 (The Republic of South Africa, 2008).

Higher categories such as Nature Reserves and Protected Environments receive more legislative support and higher rebates and tax exemptions are available. This very principle is fundamental for encouraging landowners to enter into high categories if the biodiversity value of their property so warrants. The different categories are discussed in more detail below.

2.5.4 The categories of biodiversity stewardship

The four categories of biodiversity stewardship are based on a hierarchical structure (Figure 2-5 and Table 2-7). These four categories (the Conservation Agreement, the Biodiversity Management Agreement, the Protected Environment and the Nature Reserve) are outlined and discussed in more detail below. The idea behind the hierarchical approach is that the landowner can start at an entry level and as they become more comfortable with the concept, they can move up over time (BSSA, 2009). The landowner does not necessarily have to follow the tiered approach and can subscribe to the higher level, if the biodiversity value of the property warrants it (BSSA, 2009).

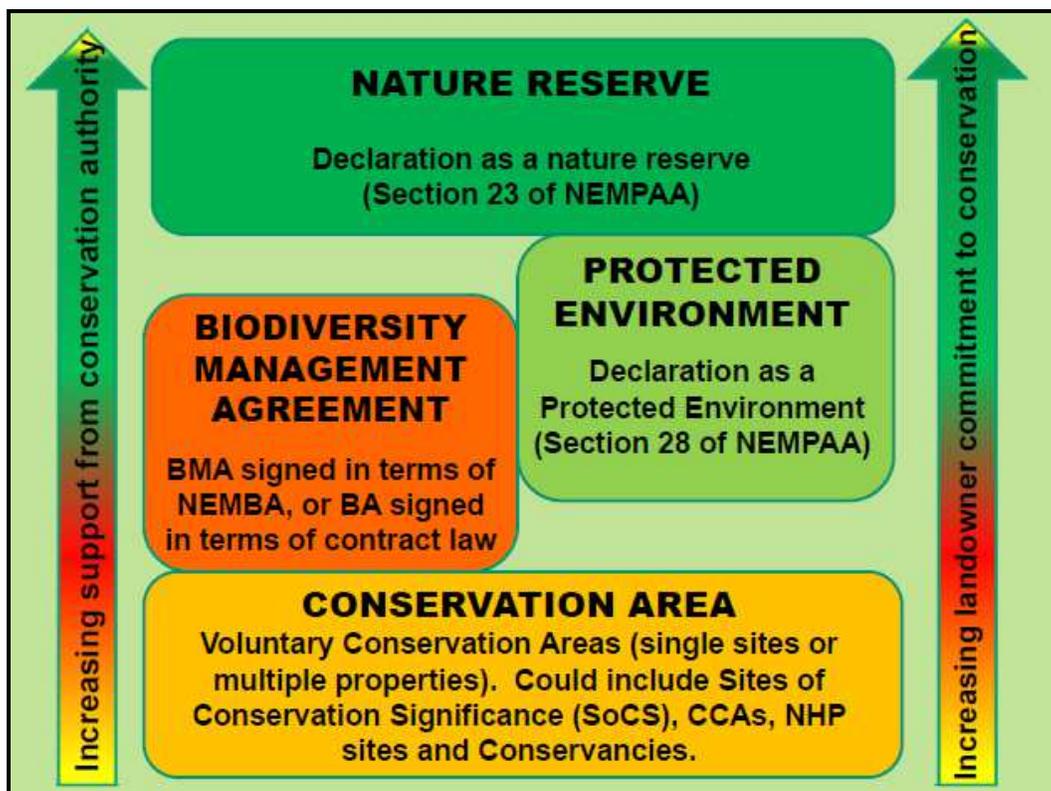


Figure 2-5: The hierarchical categories of biodiversity stewardship (BSSA, 2009:28)

The categories of biodiversity stewardship, their purpose, conservation security, duration, the criteria for each category, their legal status and land use limitations are presented below (Table 2-7). The categories will then be discussed further below.

Table 2-7: The categories of biodiversity stewardship (Cadman et al., 2010:79)

Biodiversity stewardship category	Informal agreements (Conservation Area)	Agreements under contract law (Biodiversity Agreements)	Formal protected areas	
			Protected Environments	Nature Reserves
Degree of conservation security	Weakest	Intermediate	Intermediate to strong	Strongest
Purpose	Informal, flexible agreements that enable landowner or communities to conserve and manage their properties; may provide a platform for greater site security later	A formalised partnership between a landowner or community and the conservation authority, to improve management of specific biodiversity features or elements of the landscape	Flexible category providing medium to long term protection of important biodiversity, but allowing some other land-use types that are compatible with wise biodiversity management	Provides long-term protection and management of important biodiversity on private or communally owned land; this category is preferred for sites of highest biodiversity priority
Qualifying criteria	Any natural land (if rare or threatened ecosystems or species are present, rather progress to higher level of conservation security) Applicable to portion of a property, whole property or a group of properties	Land of at least moderate biodiversity importance Applicable to portion of property, whole property or a group of properties	Landscape that include areas of biodiversity importance that require conservation management; other biodiversity-compatible land users acceptable Applicable to portion of property, whole property or a group of properties	Areas of highest biodiversity importance; contain critically important ecosystems, habitats and species and conservation management is the primary use Applicable to portion of property, whole property or a group of properties
Legal status	No legal status Voluntary Memorandum of Agreement (non-contractual) registered with conservation authority	Legal status under contract law Contract between landowner and a conservation authority	Declared in terms of national legislation governing protected areas (Protected Areas Act)	
Duration	Flexible, no fixed period of	Minimum period 5-10 years	Minimum 30 years preferred (may be in	Minimum 30 years, but

<p>Land-use limitations</p>	<p>commitment</p> <p>Few limitations but area must retain its overall natural character.</p> <p>Invasive alien plant clearing plan must be put into place</p>	<p>preferred. May be longer (even in perpetuity)</p> <p>Few land-use limitations; the property or properties to which the agreement applies must be kept in a natural or near natural state and must be managed in accordance with the agreed management plan</p>	<p>perpetuity)</p> <p>Biodiversity-compatible land-uses permissible (determined by provisions in the declaration notice), area should be kept in a natural or near-natural state and must be managed in accordance with the agreed management plan</p>	<p>preferably 50 or more or in perpetuity</p> <p>Land use restricted by provisions of the Protected Areas Act governing Nature Reserves; to be kept in a natural or near natural state and must be managed in accordance with the agreed management plan</p>
<p>Benefits to landowners</p>	<p>Basic extension services (e.g. advice on habitat management)</p> <p>Guidance on management plans and farm maps</p>	<p>Advanced extension services (e.g. planning for invasive alien clearing)</p> <p>Specific agreements for fire, invasive alien species, plants and animal management</p>	<p>Advanced extension services</p> <p>Use of the landscape regulated through co-operation between landowners</p> <p>Some income tax deductions</p>	<p>Advanced extension services and practical assistance with habitat management</p> <p>Increased recognition and marketing exposure</p> <p>Income tax deductions and municipal property rate exclusions</p>

The Conservation Area

The Conservation Area (CA) (Table 2-7) may include conservancies and community conservation areas. Although the CA does not have a legal status, there is a signed agreement between the landowner and conservation body (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). There is no defined timeframe for the CA and the agreement can be terminated at any stage. The CA serves to protect land that has important biodiversity value but the landowner is reluctant to enter into a more binding agreement, alternatively, the CA can be used for collective action and co-management between property owners (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The land should retain its natural character and be managed accordingly. The incentives for the CA include provincial recognition, advice and support from professionals from the conservation agency and management guidelines (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009).

The Biodiversity Management Agreement

The Biodiversity Management Agreement (BMA) (Table 2-7) is a negotiation between the owner and conservation authority who acts on behalf of the MEC, the agreement is a medium term agreement and the terms are defined in terms of NEM: BA (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The agreement has legal standing in terms of the contract entered into, according to NEM: BA the contract intends to formalise the conservation agreement, however, it is adaptable (BSSA, 2009).

The provision of security for the land is due to a legal agreement and a management plan. The BMA can be applied to land which conservation is worthy, the condition should be relatively pristine, and ideally, the land should make an important contribution to vegetation types, species or ecological processes (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). If the land is slightly degraded and has alien infestations, as long as the densities are low and can be managed, the property is still of conservation value (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009).

In the case that either party should not adhere to the contractual agreement, the offending party can be found to be in breach of contract and thus the matter will be dealt with accordingly (BSSA, 2009). Furthermore, any fiscal incentives that were awarded can be reclaimed (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The minimum period for the BMA is 5-10 years and can be extended to in perpetuity (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The BMA is supported by a management plan aimed at achieving common conservation objectives (BSSA, 2009).

The activities that are permissible for the BMA are unrestricted. The landowner retains all rights to the land; however, the land should be managed in such a way to conserve biodiversity and other natural processes, acts that adversely affect the natural state of the land are non-permissible (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). Development may be permitted; however, sustainable management of the land should be practised.

The BMA only receives fiscal incentives in terms of tax deductions in the management and maintenance of conservation initiatives such as erosion control, IAS clearing and burning firebreaks. The activity must be included in the management plan for the activity costs to be deducted (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The management plan that is drawn up for the property is developed by the conservation agency with the landowner's input (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). Other NGOs will be informed of the BMA and support from these organisations may be included (BSSA, 2009).

Protected Environment

The third category is the Protected Environment (Table 2-7). In terms of NEM: PAA, the Protected Environments are the least secure type of PA (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The Protected Environment serves as a legal mechanism to allow landowners to control the land activities while protecting the environment from threatened activities. The Protected Environment also enables co-operative

action between landowners and the conservation authority in conserving biodiversity (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The owner retains all rights to the property (BSSA, 2009). Protected Environments can serve as a starting point for further conservation and they can complement current PAs either serving as a buffer or creating potential for corridor development (BSSA, 2009). The landowner may seek some legal recognition for having a conservation-minded approach.

The legal status which the Protected Environment holds is in terms of Section 28 of NEM: PAA; the agreement is a contractual agreement between the MEC, landowner and conservation authority (most agreements are signed by a notarial agreement) (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). To regulate the management of the Protected Environment, a management agreement is signed by the conservation authority and conservation agency (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The title deeds do not legally have to be endorsed; however, the biodiversity stewardship programme promotes it.

The purpose of the Protected Environment varies from situation to situation. A Protected Environment can serve to implement a management plan which allows conservation without hindering the activities on the land drastically (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The incentives that are associated with the Protected Environment include the development of a management plan, technical advice, access to public works programmes and covering of the legal costs that will be incurred (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009).

The Protected Environment can serve a bigger purpose by protecting the area from development threats, specifically if the biodiversity would be drastically altered by the process. The Protected Environment will be able to ensure persistence of biodiversity, retain the natural character of the land and promote the sustainable use of resources (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). Although the activities on the Protected Environment are not limited, they cannot have a detrimental effect on the natural character of the land as no transformation of natural vegetation is allowed; neither is the introduction of alien species, nor mining, dumping of waste and activities that affect water resources are not permitted (BSSA, 2009). Development and or subdivision of the Protected Environment are only permitted if it aligns with the Protected Environment objectives (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009).

The higher categories such as the Protected Environment must be signed for more than 30 years to receive a fiscal incentive; all conservation management and maintenance is deductible in section 18A of the Income Tax Act (Act 58 of 1962) (Figure 2-5).

Nature Reserve

The fourth category in biodiversity stewardship in South Africa is the Nature Reserve (Table 2-7). The Nature Reserves are the optimal biodiversity stewardship category. The Nature Reserve is based on a contract signed between the MEC, landowner and conservation authority; the management agreement is signed by the landowner and conservation authority (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009).

The Nature Reserve category is for critically important biodiversity areas, specifically if the area houses threatened ecosystems and contains unique biodiversity features. Essentially, the area must contribute to key conservation initiatives, whether it is through ecological processes, key vegetation types or species, or contribution to the PAES (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). Important areas for Nature Reserves also include sites adjacent to current PAs, or areas contributing to corridors (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009).

The legal status of the Nature Reserve is determined by a number of different levels; in terms of NEM: PAA (No. 57 of 2003) the contracting of land into a National Park or Provincial Nature Reserve is declared by the MEC (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The Protected Area Management Agreement is another contract that is entered into by the landowner and the conservation agency (BSSA, 2009). The Notarial agreement regarding the restriction on the title deeds is also signed by a public Notary and lodged at the Deeds Office, thus, if there is ever a new owner, they will have to adhere to the restrictions put in place (BSSA, 2009). Despite the title deed restrictions, ownership is not transferred. Agreements can range in duration from 30 years to perpetuity (forever); however, contracts can only be signed for 99 years. A management authority will need to be assigned to the site and this could be the landowner or a willing third party.

Activities that are permissible on the Nature Reserve include ecotourism; however, these endeavours must align with the management plan. The sustainable extraction of resources is also allowed, however, this must be agreed to by the conservation authority, the MEC and the landowner (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). Activities that may be allowed include grazing, fishing, capture and sale of surplus game, hunting and controlled harvesting (BSSA, 2009). Any activity that will have a negative impact on the biodiversity and or natural processes should not be permitted, for example, dumping, or the introduction of alien species (including extra-limital species). However, written authorisation from the management authority and conservation agency will allow some extra-limital species (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). As with the other categories, activities affecting water supply, flow and quality are strictly non-permissible, as are off road vehicles unless they align with the objectives of the management agreement (BSSA, 2009).

The development restrictions that are imposed on the Nature Reserve include no new infrastructure that is not compatible with the zonation plan, absolutely no ploughing, cutting or transforming any ecosystem within the Nature Reserve (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). There may be no commercial mining and prospecting, no placement of transmission lines, no subdivision and no trade or industry in the Nature Reserve unless stipulated in the management agreement (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009).

The incentives that are associated with Nature Reserves include exemption from municipal property rates. The landowner may also be able to deduct from income tax at a rate of 10% of the land value (which the

landowner bought it for) over 10 years (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009) (Figure 2-6). Other incentives include technical advice and assistance from the conservation authority, alien plant clearing, fencing, fire control, game management as well as lobbying assistance from other organisations and public works initiatives (BSSA, 2009). The recognition and marketing exposure is also an incentive for landowners.

The biodiversity stewardship programme offers a range of different incentives to landowners willing to commit their land to conservation (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). The landowners committed to conservation incur costs in the management of the land and thus there are a number of fiscal incentives available to them. Tax incentives and rates rebates are mechanisms that have been documented in the Revenue Laws Amendment Act (Act 60 of 2008) (BSSA, 2009).



Figure 2-6: Incentives applying to biodiversity stewardship categories (Cadman et al., 2010:81)

The non-statutory incentives include technical assistance and extension, such as management plans, IAS plans and expertise (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). Areas that have entered in the biodiversity stewardship will receive priority funds and assistance from NGOs and other programmes as well as training and skills building (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009).

The tiered categories allow landowners to enter into conservation that is firstly, most suited to the biodiversity value of their land and secondly, that is most suited to their commitment level. Biodiversity stewardship has the potential to become a fundamental tool for securing biodiversity both inside and outside formal PAs.

The biodiversity stewardship practice of other provinces is discussed below; a detailed examination of the biodiversity stewardship practice in KZN is documented in Chapter Three.

2.5.5 Biodiversity stewardship practice in other provinces of South Africa

The role the provincial authority plays in the biodiversity stewardship programme is instrumental. Responsibilities include: initiating negotiations in priority areas, doing site assessments, drawing up management plans, negotiating terms with landowner, driving consultation process and proclaiming the site, and they are further responsible for annual assessments and national report backs (Olivier, 2011).

The responsibilities of the provincial authorities are numerous and thus cooperative governance and key partnerships between conservation agencies, NGOs and landowners is imperative (Morris, 2011). NGOs assist in the negotiations in priority areas, assisting with site assessments, and expertise in drawing up the management plan, support and assistance with the consultation process (Olivier, 2011). In Mpumalanga key NGOs such as WWF, EWT Crane Working group and Birdlife South Africa have had key partnerships with landowners for a number of years, a long association with landowners enables a fundamental in-road as biodiversity stewardship and other conservation efforts can be promoted (Morris, 2011). The NGO-landowner relationship in Mpumalanga has been an important driver in the biodiversity stewardship process, providing an important link between the landowner and the conservation authority (Morris, 2011).

The biodiversity stewardship programme in the Western Cape that is directed by CapeNature has been successful in implementing conservation on privately owned land (Hayward, 2011). The focus of many of the Western Cape's biodiversity stewardship sites is to mitigate against climate change by forming core corridor sites promoting ecological functioning. These biodiversity stewardship sites have exceptional biodiversity but are facing significant threat of loss (Olivier, 2011).

CapeNature identify the primary limitations of the biodiversity stewardship programme in the Western Cape to be the issue of trust, as often landowners have mistrust towards the conservation authority due to high staff turnover. The relationship of trust between the stewardship practitioner and the landowners must be maintained (Haward, 2011; Geldenhuys, 2011). In dealing with multiple landowners, it is important to ensure the intentions of the landowners from the outset (Hayward, 2011). A further complication arises as any non-compliance by the landowners has to be reported by the stewardship extension officer, further diminishing poor relationships (Rossouw, 2012). Landowner confidence is based on a deeper understanding of stewardship (Rossouw, 2012). Numerous landowners see the positive side of stewardship but also enter into the programme for the positive spinoffs in terms of incentives and marketing as some landowners export produce to an international market (Hayward, 2011; Geldenhuys, 2011).

Funding of the biodiversity conservation in all provinces is a major limiting factor. In Mpumalanga there is a need for more biodiversity stewardship officers; however, funding is not available (Morris, 2011). Often in agreements, costs and support is not clear, this can create mistrust between landowners and the conservation authority (Hayward, 2011; Geldenhuys, 2011). In the record of decision it should be clear who is responsible for which costs and open regular conversation should be ensured so as to keep all parties happy (Hayward, 2011; Geldenhuys, 2011). Other limitations include the reluctance to enter into long-term agreements and a

refusal to commit to future generations especially as there may be political uncertainty. Landowners who enter the stewardship programme reactively due to the identification of the importance of their land are often difficult and unwilling (Rossouw, 2012). Reactive stewardship depletes the limited provincial conservation authority resources.

The biodiversity stewardship officers can only support a certain amount of sites; this is a serious limitation (Olivier, 2011). Capacity is a major constraint. CapeNature has too few staff to maintain the current stewardship sites and sign on more sites; this creates frustration among landowners as their support base is spread too thin (Hayward, 2011; Geldenhuys, 2011). According to Steyn (2011), it is more important to take on fewer sites and service them properly, than to take on too many sites and not perform properly. Some landowners get frustrated as they commit their land to a Nature Reserve but find commitment from the DEA is poor; they are not conservationists, botanists or ecologists and need the technical support (Hayward, 2011; Geldenhuys, 2011). Rossouw (2012) identifies the need for a platform for likeminded landowners to engage and interact with each other and conservation officials.

The biodiversity stewardship programme in Mpumalanga, driven by MTPA, identifies the time consuming nature of the biodiversity stewardship process to be a principal limitation. The process of entering into the biodiversity stewardship process is lengthy and drawn out, and landowners get frustrated. It is important to keep a positive approach to landowners and keep them informed (Morris, 2011). Steyn (2011) identifies the need to outline the time consuming nature, not due to incompetence, but because of due diligence.

Another limitation is scepticism by landowners about ‘restrictions’ on farming practices. It is vitally important to provide technical information in such cases so that a positive relationship is maintained (Hayward, 2011; Geldenhuys, 2011). The site assessments conducted need to have scientific and ecological support, and a concise and credible motivation for proclamation should be compiled (Morris, 2011). The site assessments should be as accurate as possible and defensible against objections and scrutiny (Morris, 2011). It is difficult to be subjective when the landowner is a willing participant. The site should adhere to a number of different factors and not simply be based on landowner willingness (Steyn, 2011).

2.6 South Africa’s grasslands

South Africa’s surface area is about 2% of the world surface, containing approximately 10% of the world’s plant species, 6% of the total mammal species, 7% of the world’s bird species and 6% of the known insect species (DEAT, 2005:61; DEA and SANBI, 2009a). In terms of richness in biodiversity, South Africa ranks twenty-fourth worldwide and fifth in Africa (DEAT, 2005). South Africa is also recognised as having three biodiversity hotspots. A biodiversity hotspot is an area with extremely high biodiversity but at the same time, is also under extreme pressure and threat (DEAT, 2005). These hotspots include the Cape Floristic Kingdom, which only covers about four percent of Southern Africa but contains forty percent of the sub-continent’s flora (DEAT, 2005). Succulent Karoo is an arid hotspot and has a number of succulents that are endemic;

consequently, there are also a number of specialised insects and mammals. The Maputaland-Pondoland-Albany centre of endemism is also a biodiversity hotspot (DEAT, 2005).

Although South Africa's other biomes do not fall under the biodiversity hotspots, many of the biomes still have a high level of biodiversity. Other biomes include South Africa's smallest biome, the desert biome, Nama Karoo biome, the Savanna biome, the Albany Thicket biome, the Forest biome and finally the Grassland biome.

2.6.1 Grassland biome

A grassland is any piece of land that has grasses as the dominant form of vegetation. Although it is common practice to include all grass dominated land in the "grassland biome" there are two distinct types namely: temperate and tropical (Mucina, Hoare, Lotter, Rutherford, Scott-Shaw, Bredenkamp, Powrie, Scott, Camp, Cillers, Bezuidenhout, Mostert, Siebert, Winter, Burrows, Dobson, Ward, Stalmans, Oliver, Siebert, Schmidt, Kobisi and Kose, 2006). Mucina et al. (2006:351) go on to describe grassland as follows: "...grassland refers to herbaceous vegetation of relatively short simple structure". Grasslands are generally a vacant tree or woody plant niche, usually characterised by fertile soil, seasonal precipitation and a growing season lasting about half a year (Mucina et al., 2006).

The grassland biome of South Africa makes up between 21.3% and 26.4% of the landscape (Figure 2-7). In South Africa, the grassland biome is environmentally defined by summer rainfall and relatively low temperatures during wintertime (Mucina et al., 2006). It occurs primarily in the Highveld (central plateau), inland of the eastern seaboard and in the mountainous areas of KwaZulu-Natal and the Eastern Cape (Mucina et al., 2006) (Figure 2-7). Grasslands are found at varying elevations. Characteristically the Midlands Mistbelt grassland and various others types are evident from 300-400 metres above sea level. Other types of grasslands can be found up to 3000 metres above sea level (Mucina et al., 2006).

The grassland vegetation types are based on the environmental factors, floristic factors, altitude and moisture (Mucina et al. 2006). Some examples of the grassland vegetation types include the Drakensberg Grassland, the Dry Highveld Grassland and the Sub-escarpment Grassland to name a few. Topographically grasslands are associated with 'flat to rolling' hills; however, they also occur on mountainous escarpments (Mucina et al., 2006).

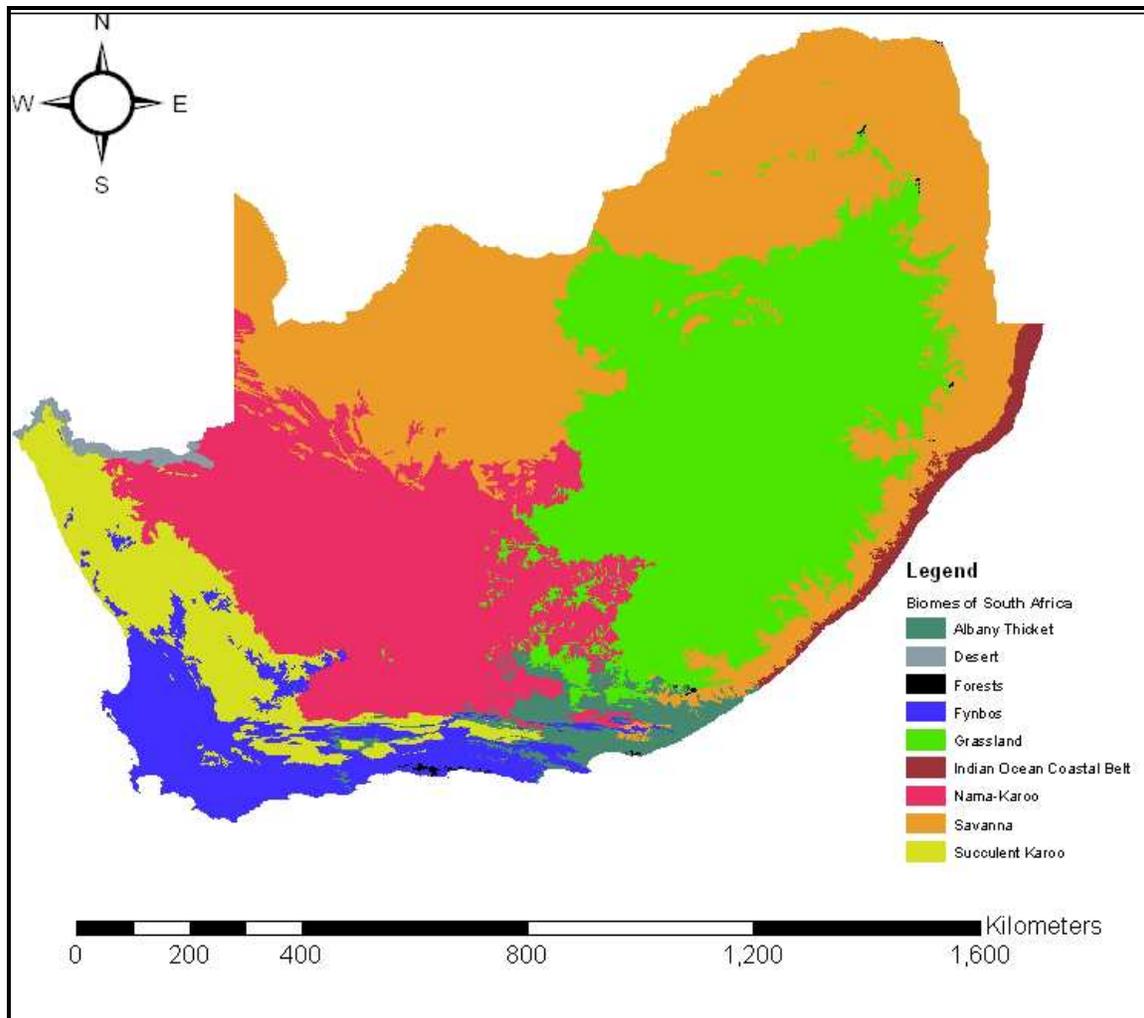


Figure 2-7: The biomes of South Africa (adapted from Mucina and Rutherford, 2006)

The grassland biome has numerous vegetation types each with varying conservation statuses. According to O'Connor and Kuyler (2009), the grassland biome supports many different species, communities and ecosystems; it harbours numerous centres of endemism, plant species, butterflies, mammals and bird species. Nonetheless, it is one of the "...most poorly maintained biomes in southern Africa, 23% is under cultivation, 60% is irreversibly transformed and only 2% is protected, and most of the remaining natural area is used as rangeland for livestock" (O'Connor and Kuyler, 2009:384; O'Connor, Kuyler, Kirkman and Corcoran, 2010). Erosion and improvement in agricultural practices further increase the loss of the grassland biome. More than half of South Africa's grassland biome has been transformed, and more concerning is that the remaining grasslands are highly fragmented, some being only a few hectares in extent (Mucina et al., 2006). Sandwith (2002) argues that grasslands have only incidentally been protected. Grasslands provide essential ecosystem services and a large amount of the human population is reliant on the resources it provides, so serious implications are attached to the loss of grassland biodiversity (O'Connor and Kuyler, 2009).

2.6.2 Grassland biodiversity and ecosystem goods and services

Highly dynamic, the grassland biome provides goods and services that support flora, fauna and humans worldwide. EGS provided by grasslands include: food, forage for livestock, biodiversity, carbon storage and tourism and recreation (White, Murray, and Rohweder, 2000) (Figure 2-8).

The production of food is dependent on biodiversity and numerous ecological processes; natural predators such as birds and wasps play a role in pest control (DEA, 2010; Fischlin, Midgley, Price, Leemans, Gopal, Turley, Rounsevell, Dube, Tarazona, Velichko, 2007). Origination of grains for food such as wheat, maize and barley stem from grasslands (White et al., 2000). Genetic resources grasslands aid in the improvement of crops and development of pharmaceuticals (White et al., 2000). The forage produced by grasslands for domestic livestock indirectly supports human livelihoods as meat, milk, wool and leather are the products of livestock (White et al., 2000). Grasslands also support the breeding and migration of many bird species, providing the perfect habitat for soil fauna and wild herbivores (White et al., 2000).

The ecosystem functioning of the grassland system ensures water and nutrients are effectively recycled. Most of South Africa's water originates from mountain ranges in grasslands (Egoh, Reyers, Rouget and Richardson, 2011). Grasslands play an important role in the hydrological cycle reducing immediate runoff and erosion (DEA, 2010; Egoh et al., 2011).

Grasslands provide large storehouses of carbon, both above and below ground (White et al., 2000; Egoh et al., 2011). Furthermore, the aesthetic and recreational activities which grassland supply extends from wildlife watching and tourism, to spiritual gratification and hunting (White et al., 2000; Egoh et al., 2011). In South Africa, traditional uses of grasslands extend to the collection of medicinal plants and the use of grass for thatching in buildings (Egoh et al., 2011).

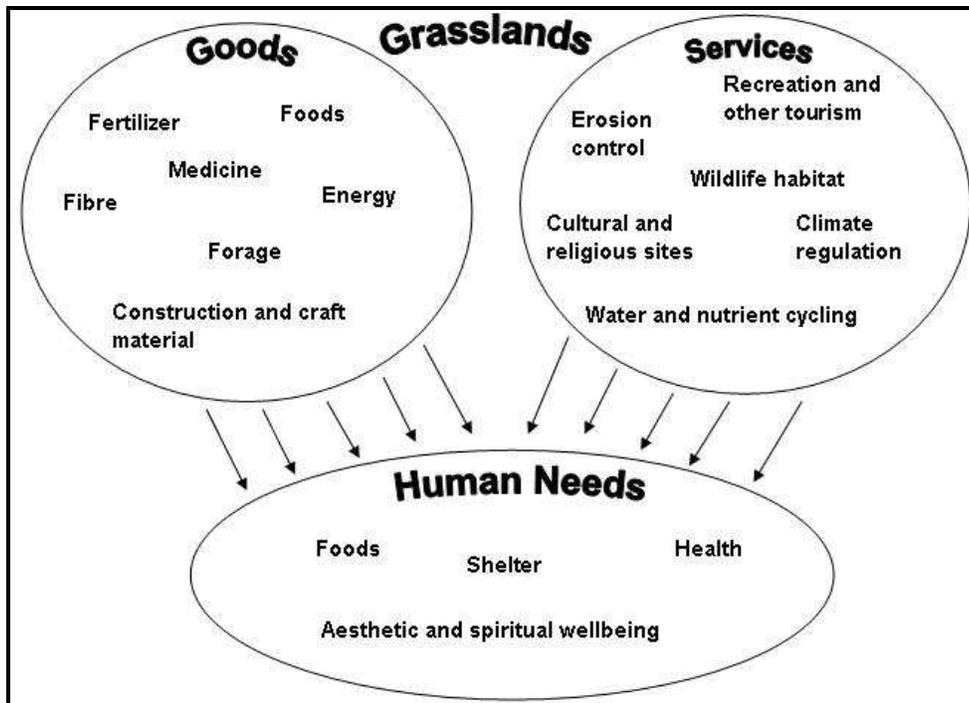


Figure 2-8: Ecosystem goods and services provided by grasslands (modified from White et al., 2000)

The EGS provided by grasslands are extensive; however, the main uses of grasslands, if exploited and used incorrectly, will become the biggest threats to grasslands (Aguiar, 2005; White et al., 2000). Other threats include “...climate, atmospheric composition, and non-planned species exchanges, and these changes combine to threaten ecosystem integrity on a global scale” (Aguiar, 2005:262). The main consequence of the loss of biodiversity in grasslands is the reduction of the ecosystem health to provide natural resources (Aguiar, 2005).

2.6.3 Threats to grassland biodiversity

Grassland areas are extensively used and are subjected to a wide variety of threats. Key threats are land use pressures and poor management of fire, grazing and hydrological processes. IAS and climate change also threaten grassland biodiversity (Biggs et al., 2008).

Agriculture is associated with habitat destruction, altered land use through grazing, cropping and forestry (Aguiar, 2005; Ehrlich and Pringle, 2008; Berliner and Desmet, 2007). Both cropping and forestry have a negative effect on grassland biodiversity (Berliner and Desmet, 2007). The planting of crops modifies both the above and below plant biomass and the organic soil matter is altered. The forestry component changes both the light environment and soil nutrient dynamics (Aguiar, 2005). Cropping, forestry and grazing further place pressure on the hydrological aspect of grasslands.

Watersheds connecting many ecosystems are influenced by changes to those ecosystems. From a hydrological perspective, grasslands are often limited by the availability of water and humans can alter the flow regimes of grasslands (Gitzen, Wilson, Brumm, Bynum, Wrede, Millspaugh and Paintner, 2010).

Fire is another major component in the maintenance and structural dynamics of many types of grasslands. “Landscape heterogeneity due to grazing (and fire) is an important characteristic of grassland ecosystems, and responsible for much of the biological diversity” (Gitzen et al., 2010:15). If there were to be an absence of fire, much of South Africa’s grasslands would be dominated by woody plants and shrub land (Mucina et al., 2006). Fire is critical in temperate grasslands as nitrogen levels are altered and plant growth is stimulated thus attracting ungulates to graze. Conversely, the intensity of the fire is affected by the previous grazing regime (Gitzen et al., 2010).

Intense and prolonged grazing has a detrimental effect on the health and diversity of grasslands, in turn affecting the species reliant on the grassland (Gitzen et al., 2010). Selective grazing patterns of domestic herbivores cause compositional changes of the plant community, affecting biodiversity (Aguiar, 2005). Moreover, heavy grazing by livestock and trampling compacts the soil and alters the soil characteristics, reducing basic functions such as infiltration. Poor infiltration aggravates soil erosion (Gitzen et al., 2010).

Previously grasslands may have been grazed with a high intensity but a low frequency. Many types of grasslands have evolved with grazing by ungulates. Grazers can increase aboveground productivity as nutrient uptake may be stimulated and nitrogen can be redistributed by the faecal and urine deposits (Gitzen et al., 2010). Generally grazing species would migrate; however, most agricultural grazing practices are homogenous and uniform (Gitzen et al., 2010). Heavy and intensive grazing can alter the plant community beyond rehabilitation: hindrance of seed production, loss of pollinators or seed dispersers and loss of organisms that aerate the soil (Gitzen et al., 2010; Mucina et al., 2006; Aguiar, 2005). The degradation of grasslands would not be conducive to a stable environment, as grasslands supply humans with a number of EGS.

Introduced by people, the non-native species inflict havoc on local species through predation and competition for natural resources (Ehrlich and Pringle, 2008). Grasslands are susceptible to invasions by alien species, especially if the grassland is disturbed or degraded (White et al., 2000). Dukes (2001) argues that the more diversity and composition within resident species, the less susceptible they are to invasion of alien species. Diverse species are thought to use resources more efficiently, making them more resistant to invasion. Therefore, as Dukes (2001) suggests, diverse communities buffer the ecosystem against invasion. Breaking down of dispersal barriers that enable non-indigenous species to invade and alter habitat and cause extinction of grassland species (White et al., 2000). The transformation of habitats alters vegetation and impacts on biodiversity in grasslands (White et al., 2000). In South Africa, extensive invasion of grasslands by non-native species is apparent, black wattle (*Acacia mearnsii*) and Pompom weed (*Campuloclinium*

macrocephalum) are only two of the many IAS threatening grassland biodiversity (Richardson and van Wilgen, 2004; van Wilgen, Khan and Marais, 2011).

Climate change will influence grassland biodiversity. A prediction of an increase of 2°C or more would dramatically reduce the grassland biome. Stark predictions are made by Mucina et al. (2006:354) that “this increase in temperature and aridity may obliterate the western portion of the biome and possibly a third to 55% of the biome extent may be lost”. An increase in temperature would allow more woody plants to invade, as their seedlings would not be eradicated by the frost (Mucina et al., 2006). Aguiar (2005) argues that although grasslands are susceptible to climate change, the sensitivity of the grassland biome to climate change is not as severe as other biomes as they are located at mainly temperate regions.

There is no escaping the fact that grasslands will still be extensively used ecosystems and conservation of grasslands needs to address a multitude of different factors.

2.6.4 Conserving South Africa’s grasslands

Some biomes such as forests, fynbos and desert have their area target secured in PAs, while the grassland biome, Nama and Succulent Karoo biomes fall considerably short of the PA target (Table 2-8) (DEA and SANBI, 2009a). There is potential to cost effectively meet the targets for Nama-Karoo and parts of the Succulent Karoo (The Republic of South Africa, 2010). The grassland biome lacks potential, due to the competing land and resource uses. This makes grassland ecosystems a priority for conservation efforts (The Republic of South Africa, 2010; Egoh et al., 2011).

Table 2-8: Area protected and percentage of protected area target met by biome (DEA and SANBI, 2009a:45)

Biome data			Area protected		
Biome	Biome area (ha)	Biome PA target(ha)	PAs (ha)	% of PA target	% of biome
Water bodies	67 300	8 800	54 300	614	81
Forests	471 500	108 700	176 200	162	37
Fynbos Biome	8 395 200	1 257 600	1662 600	132	20
Desert Biome	716 400	130 700	159 800	122	22
Savanna Biome	41 266 300	4 233 900	3779 600	89	9
Albany Thicket Biome	2 913 300	303 300	208 000	69	7
Azonal Vegetation	2 898 300	405 800	203 000	50	7
Indian Ocean Coastal Belt	1 428 200	195 700	97 000	50	7
Succulent Karoo Biome	8 328 700	1 025 300	434 700	42	5
Grassland Biome	35 449 300	4 771 500	701 300	15	2
Nama Karoo Biome	24 819 600	2 769 900	180 400	7	1

The current protected network of the grassland biome in South Africa comprises a few small reserves, and the cumulative area is inadequate for conserving biodiversity (O'Connor and Kuyler, 2009). Characterised by rich biodiversity, the South African contribution to the Transfrontier Park (the uKhahlamba Drakensberg Park) supports many endemic plant species and has a rich biodiversity (Mucina et al., 2006). Although the Maloti-Drakensberg Park and uKhahlamba Drakensberg World Heritage site is about 2000km², it protects a higher altitudinal montane environment and thus only a limited portion of the grassland biome.

The grassland biome forms part of the local economy playing an integral part in the livelihoods and culture of people (Berliner et al., 2006). Activities such as conservation, livestock or game ranching, tourism and recreation were also more favourable uses for grasslands. Other activities such as dairy, timber and urban activities had severe impacts on grassland biodiversity (O'Connor and Kuyler, 2009). Continuing land transformation and lack of prospect for PAs expansion makes mainstreaming biodiversity within other land uses significant (O'Connor and Kuyler, 2009).

Identifying sustainable ways of conserving grassland biodiversity without hindering agricultural development is important (Biggs et al., 2008). Biodiversity loss in grasslands is not necessarily from grazing and agriculture, but the result of poor grazing and agricultural practice (Donaldson, 2002). Controlling grazing practices and stocking rates can favourably alter plant composition. According to Gitzen et al. (2010), under certain conditions species diversity can be increased by grazing. Grazing pressures, canopy structure and species composition is subject to the intensity of the grazing. There are indeed exceptions as different thresholds may be held by different plant communities (Aguiar, 2005). "A recent review of the effects of grazing on spatial structure of plant communities found that currently there is no strong evidence that grazing disrupts vegetation patterns" (Aguiar, 2005:266). However, grazing does have an effect on the composition of the plants and the population level of the plants (Aguiar, 2005). The rangeland theory assumes that species reduced by overgrazing are able to recover only if there is proper management and if the environment has not been changed considerably (Aguiar, 2005).

Improvements in farming practices and management would thus have a positive effect on biodiversity (Donaldson, 2002). Farming practice and conservation in South Africa has been based on the policy of optimum resource utilisation. Principally agriculture should be in harmony with the natural environment to be economically viable and sustainable (Donaldson, 2002). Conservation farming practices are adopted by many committed farmers who are aided and informed by agricultural policy, legislation and conservation authorities. Biodiversity issues have increasingly been addressed by farmers (Donaldson, 2002). "An important feature of South African agriculture has been conservation farming, which seeks to maintain the balance between utilisation and conservation of agricultural resources above the level at which resources totally collapse" (Donaldson, 2002:43).

Initially soil underpinned how conservation techniques were implemented into farming practices; nowadays-greater emphasis is placed on veld condition, agro-biodiversity and sustainability (Donaldson, 2002). Key

events such as droughts, economic crises, scientific advances and political developments have been responsible for the development of conservation farming (Donaldson, 2002). A good conditioned veld performs better for water infiltration with less soil loss and higher production (Donaldson, 2002). “It was recognised that farmers needed to manage their lands not only to reduce soil erosion, but also to deal with other environmental problems that impacted on agricultural production” (Donaldson, 2002:45).

The planning and implementation of grassland biome conservation stretch across numerous administrative boundaries (Berliner et al., 2006). The lack of capacity of the different levels of government acquiring land for grassland conservation is a primary limitation. Legislation is well rounded but implementation is inefficient and conservation of grasslands is not completely based on systematic conservation principles (Mucina et al., 2006; DEAT, 2005).

2.6.5 Systematic conservation planning of the grassland biome

In the past, SCP has not been a guiding method for grassland conservation; however, aspects of SCP are now being adopted. Generally, the conservation approach to the grassland biome in South Africa is to focus on highly threatened, endangered, or rare species such as the Blue Swallow (*Hirundo atrocaerule*), crane species: Wattled Crane (*Grus carunculatu*), Blue Crane (*Anthropoides paradiseu*), Grey Crowned Crane (*Balearica reguloru*), Oribi (*Ourebia ourebi*) and other bird species (Mucina et al., 2006). Endemic avifauna is one of the most common measures used to define priority areas for grassland conservation. Endemic species are species that are restricted to a certain area and a prescribed extent, thus important for identifying critical conservation areas (Brooks et al., 2006). This umbrella approach identifies the need to conserve the grassland habitats in which these species live, ensuring the conservation of other species.

South African National Parks (SANParks) manage PAs that already exist and participate in the planning and expansion of new and existing PAs (Holness and Biggs, 2011). SANParks is subsequently responsible for the conservation of the grassland biome. The principles of SCP influence the SANParks spatial planning process, and aid in underpinning threats and response strategies for climate change and habitat fragmentation (Holness and Biggs, 2011).

The Grasslands Programme is a national initiative with a primary goal to sustain and secure the grassland biome (Grasslands Programme, 2010). This national initiative aims to secure grassland biodiversity and the ecosystem goods and services provided by grasslands for future generations. The Grasslands Programme adopts the SCP principles and aims to secure and manage PAs that conserve a representative sample of biodiversity and consider key ecological processes (Grasslands Programme, 2010). One of the main objectives of the Grassland Programme is to mainstream biodiversity into plans, policies and programmes; ensuring the ecological integrity of the grassland biome is upheld. Supporting SCP, the Grassland Programme is pivotal in the managing and monitoring of the grassland biome. SCP has influence over policy and legislation in South Africa and these filter down to grassland conservation. While SCP is the planning

aspect of conservation, a mechanism such as biodiversity stewardship is an implementing tool to achieve the goals set out by the SCP.

A biome such as the grassland biome will benefit greatly from the biodiversity stewardship programme. The grassland biome is extensively used, yet under-protected, and a mechanism of implementation such as biodiversity stewardship can promote sustainable use while securing and promoting biodiversity conservation.

Fundamental to biodiversity stewardship is the participation of multiple stakeholders, the theory on stakeholder dynamics is explored.

2.7 Theory on stakeholder dynamics

Conservation planning is faced with an “implementation crisis” as many conservation planners are preoccupied with the refinement of conservation assessments (Knight et al., 2006). The success of systematic conservation planning and its usefulness for implementation of conservation plans is largely dependant on stakeholder partnerships (Knight et al., 2006). To achieve conservation goals multiple stakeholders are involved (Biggs, Abel, Knight, Leitch, Langston and Ban, 2011).

Environmental problems are dynamic and require transparency during decision-making as a diverse knowledge base is embraced (Reed, 2008). Common stakeholders involved in conservation are local communities, non-governmental organisations (NGOs), private landowners, local government and special interest groups (Desai, 2010). The diversity of the stakeholders results in different values and perspectives (Biggs et. al, 2011). Lack of commitment among stakeholders, internal tensions and conflicting interests of stakeholders are the primary causes for unsuccessful conservation initiatives (Reed, 2008; Pelsler, Redelinghuys and Velelo, 2009). Despite the fact that people are the cause for conservation issues, they are also responsible for the solutions (Knight, Cowling and Campbell, 2006).

Developing lasting partnerships between stakeholders, government and NGOs coupled with persistence of nature is the ultimate aim of conservation. (Knight et al., 2006). Collaborative management is the sharing of responsibility, rights, power, management and duties between different stakeholders and government (Carlssona and Berkes, 2005). Each stakeholder has their own specific function and responsibilities and they can jointly address any emerging problems or issues. Stakeholder collaboration, which spans across the different scales and organisations results in an effective means to bridge gaps in environmental governance and protected area use (Jamal and Stronza, 2009). Stakeholder collaboration is recognised as an important aspect of conservation planning and natural resource management (Knight et al., 2006).

As some stakeholders may be unable to provide certain resources such as technology or diverse information, they may rely on NGOs or the government for these aspects. Collaborative management is adaptive, flexible, and active learning and changes are expected (Carlssona and Berkes, 2005).

“Core to the planning-implementation gap in conservation is the failure to achieve the necessary shared vision and collaboration among typically diverse stakeholder groups to translate conservation assessments and plans into sustained on-ground outcomes for conservation” (Biggs et al., 2011:169). Interrelationships and interdependencies of multiple stakeholders are complex due to diverse and opposing views and values (Jamal and Stronza, 2009). To address these complexities it is suggested that there is mutual understanding and decision-making (Jamal and Stronza, 2009). To strengthen stakeholder collaboration and the success of conservation implementation the following ideologies can be addressed (Reed, 2008; Biggs et al., 2011):

- transparency, clear and open communication;
- flexibility to changing circumstances;
- overcoming obstacles by incorporating diverse and multiple sources of knowledge and values;
- sharing ownership of the conservation plan; and
- strengthening partnerships.

Addressing these pertinent ideologies aims to improve conservation implementation. As identified by Knight et al. (2006), stakeholder collaboration is equally as important to conservation implementation as the conservation assessments. Collaboration of a number of diverse stakeholders promotes adaptive co management. Adaptive co management promotes learning through feedback, and helps to build capacity.

In South Africa, stakeholder involvement in environmental decision-making is embedded into national policy. A number of principles reflected in the Constitution and the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) guides stakeholder participation and collaboration (The Republic of South Africa, 1996). Ongoing policy trends emphasis working partnerships and sustainable development (Reed, 2008). Grassroot participation of stakeholders in managing natural resources is a key aspect to the sustainability principle (Jamal and Stronza, 2009). Sharing information and telling people about the protected area is also integral to the management of that area (Jamal and Stronza, 2009). Destination marketing, land uses planning and conservation in the past have been isolated from each other (Jamal and Stronza, 2009). This is detrimental as informed stakeholders and their active participation is valuable in terms of policy support, appreciation of protected areas and taking on stewardship roles (Jamal and Stronza, 2009).

The complexity of conservation planning and implementation is owed to the fact that it spans across multiple municipal boundaries and biomes and has a number of different stakeholders. Conservation of all biomes of South Africa faces these challenges, specifically the grassland biome.

2.8 Conclusion

The well-being of humans is dependent on biodiversity and ecosystem health. Biodiversity provides a number of goods and services. It is apparent that the conservation of biodiversity throughout the world and in South Africa has not been done in a methodical way. Degradation and threats to biodiversity are evident and protection of biodiversity has not been adequate. There have been a number of attempts to address these threats from legislation to guiding principles. An approach that has brought a much-needed structured approach to conservation planning is SCP. The principles of SCP incorporate the ideologies of representation, persistence, ecological connectivity and spatial efficiency. The biodiversity stewardship programme is based on these principles of SCP and is further supported by South African legislation. Biodiversity stewardship is a fundamental tool for conservation of threatened biomes in South Africa, specifically the grassland biome.

Building on the literature, Chapter Three provides an overview of the broader conservation-planning situation and the biodiversity stewardship programme in KZN, specifically for the grassland biome. The biodiversity stewardship sites that were used as case studies for the current research are described.

Chapter 3. Background of KwaZulu-Natal conservation planning and case study sites

3.1 Introduction

This chapter provides an overview of conservation planning and the biodiversity stewardship programme in KZN, as well as a description of each of the biodiversity stewardship sites that were used as case studies. This sets the local context for the research process and provides a basis from which to understand the research results.

The mandate for the conservation of biodiversity is the responsibility of national, provincial and local governments (Ferrar and Lötter, 2007). The cooperative, transparent and participatory nature of dealing with the environment and sustainable use of resources is further promoted in other national laws (Ferrar and Lötter, 2007). Consequently, provincial agencies such as KZN follow approaches outlined at national level. Guided by the National Spatial Biodiversity Assessment (NSBA), the National Protected Areas Expansion Strategy (NPAES) and SCP, KZN has developed comprehensive plans for biodiversity conservation in the province.

This chapter provides a background to the development of the conservation approach adopted in KZN. It discusses how features are analysed and integrated into the spatial conservation plan, and goes on to identify how conservation initiatives are being implemented to achieve targets set out in these spatial plans. One such strategy of implementing conservation initiatives is the biodiversity stewardship programme. Cases studies of three biodiversity stewardship sites are examined to evaluate their contribution to biodiversity conservation, achieving grassland biodiversity persistence, representation and spatial efficiency.

3.2 Conservation planning in KwaZulu-Natal

KZN falls within an extremely biologically rich “transition zone between the tropical biota found to the north and sub-tropical biota to the south” (Goodman, 2003:3). The rich biodiversity of KZN makes conservation in the province important both nationally and internationally (Goodman, 2003).

Provincial governmental departments are responsible for environmental governance in the provincial sphere (Müller, 2009). In KZN, the provincial governmental department mandated with environmental management is the Department of Agriculture Environmental Affairs (DAEA): decision making regarding sustainability, environmental issues and land use planning are key functions of DAEA (DAEA, 2011). EKZWN is a parastatal conservation body, mandated with biodiversity conservation and DAEA and EKZWN work towards the same goal of promoting sustainable development.

EKZWN is a relatively newly formed entity: the former Natal Parks Board and the KwaZulu-Natal Department of Nature Conservation amalgamated shortly after the democratic elections of South Africa in

1994 (Goodman, 2003). Politically, conservation was not seen as a priority, making resource allocation within the provincial conservation bodies difficult (Goodman, 2003). The newly formed EKZWN has faced many limitations and difficulties as there are too many staff lacking resources.

One of EKZWN's main goals is to work towards the protection and sustainable utilisation of the natural environment so that the life-supporting natural systems can be available for the people of the country. According to EKZWN (2009), conservation goes hand in hand with sustainable development, in that biological resources should be managed in such a way so that they can meet the needs of future generations. Ideally, conservation should include a multitude of different factors, preservation, maintenance and sustainable use of the ecological resources, and the enhancing of the natural environment (EKZWN, 2009).

EKZWN is accountable to the community of KZN, and although EKZWN is mandated to manage the 96 PAs that cover only 8% of the area, ecologically sensitive habitats and ecosystems outside of PAs also fall under EKZWN's directive (EKZWN, 2009). EKZWN has a legislative backing driving its initiatives in the KZN Nature Conservation Act of 1997 (EKZWN, 2009).

Upholding their responsibility to conserve biodiversity assets, EKZWN has a well-developed fine scaled PA expansion plan that aligns with the NPAES. The finer scale of the KZN PA expansion plan allows for specific focus on more threatened ecosystems, such as the grassland biome. KZN also has a resolute systematic conservation plan, the Terrestrial Systematic Conservation Plan (TSCP), last updated in 2010, that builds on the national plans at a provincial level (Escott, 2011). The TSCP provides a basis for EKZWN and DAEMA to review biodiversity conservation and identify high value areas for future attention. The TSCP is extensively used in supplementing and supporting other spatial planning tools such as municipal IDPs and SDFs. The subsections below will describe both the KZN PAES and the EKZWN spatial plans. The role they play in biodiversity conservation and land use planning will be highlighted and their link to national plans and strategies such as the NSBA will be outlined.

3.2.1 Ezemvelo KwaZulu-Natal Wildlife spatial conservation plans

NEMA mandates EKZWN to ensure the SCP principles of representation of important biodiversity features and persistence of those features within the KZN boundaries (Escott, 2011). In KZN, the C-Plan and the Maputaland Conservation Planning System and Conservation Assessment identify spatially explicit priority areas and aid in decision-making (Smith and Leader-Williams, 2006). C-Plan has been used extensively in many bioregional conservation plans and by many provinces in South Africa. Municipalities such as the Msunduzi Municipality in KZN are utilising the C-Plan software for planning (Berliner et al., 2006). Municipalities use the C-Plan software in the Environmental Impact Assessment (EIA) and SDF process to identify and avoid biodiversity rich and sensitive areas, while focusing development on the transformed areas.

As set out in the NSBA, most provincial Systematic Conservation Plans adopt a scientific analytical approach and the procedure is data and assessment driven (Ferrar and Lötter, 2007). In 2007, EKZNW developed the KZN C-Plan: it used irreplaceability and Minset to spatially map and identify sites that held high irreplaceability values and those that did not. An updated version is the EKZNW 2010 Terrestrial Systematic Conservation Plan (TSCP) hereafter referred to as the TSCP (Figure 3-1). The TSCP has great significance and is a pivotal aspect in the GIS operations performed in this research.

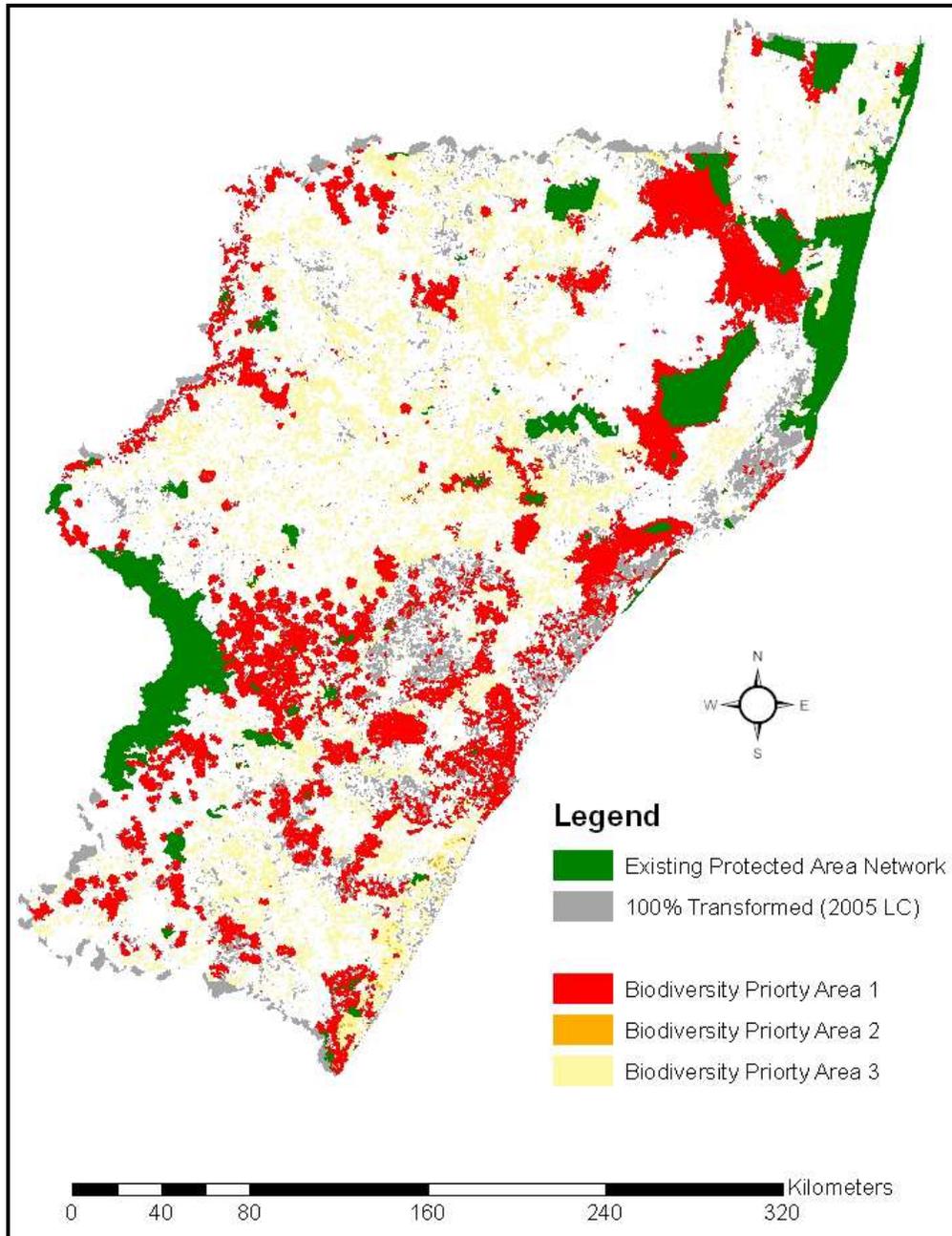


Figure 3-1: TSCP (adapted from EKZNW, 2010b)

TSCP spatially identifies biodiversity important areas, potential impacts on the biodiversity and developing the best possible way forward (Escott, 2011). The TSCP uses broad environmental surrogates to represent the planning region's biodiversity to ensure the long-term maintenance, aiding in representation and persistence (Smith and Leader-Williams, 2006). The IUCN Red list status species are used to inform the TSCP; these species act as an umbrella species (Escott, 2011). The vast number of plant species means that in the planning process, ecosystems are incorporated and if a representative portion of the ecosystem can be conserved, the features within it will be conserved too (Escott, 2011).

Minset is based on a 'minimum set' of planning units that fulfil the predefined conservation targets (Margules and Pressey, 2000). In the TSCP, the Minset output maps identify negotiable areas for conservation. The TSCP is based on the Minset output map analysing the irreplaceability map and in conjunction with decision support layers it locates a minimum area requirement to meet targets while simultaneously meeting as many decision objectives as possible (EKZNW, 2010). Targets for conservation planning are formulated by an extensive consultative process with input from a multitude of different experts and stakeholders (Berliner et al., 2006). Stipulated conservation targets vary from species to ecosystems "due to the specificity required, a combination of field expertise, scientific study and raw data are used in the determination of the targets adopted in the TSCP" (Escott, 2011:31). In the TSCP, the decision support layers incorporated in this process include high water production, macro ecological processes, agricultural potential, combined minimum patch size and degradation (EKZNW, 2010).

1. Agricultural potential: avoiding areas of high agricultural potential to minimise future land use conflicts;
2. Macro-ecological corridors are provincial and attempt to establish linkages from east to west and north south;
3. Minimum patch size/degradation coverage, this is based on viable patch sizes within the EKZNW provincial vegetation map, this coverage also accounts for proximity to low density settlements;
4. Water production areas; areas of net water production.

The TSCP identifies the Protected Area Network (PAN), the Transformation areas and the three Biodiversity Priority Areas (BPAs). Biodiversity Priority Area 1 (BPA 1) indicates areas with a high irreplaceability score of 1, and there are no replacements for this area (EKZNW, 2010). Biodiversity Priority Area 2 (BPA 2) have irreplaceability scores of ≥ 0.8 and <1.0 and indicates areas where only a few localities that can replace this area. Biodiversity Priority Area 3 (BPA 3) indicates areas have lower irreplaceability score of <0.8 ; other localities can replace this area (EKZNW, 2010).

Thus, the best possible areas will be selected for conservation and should the areas have conflicting land uses, the next best option are selected. Areas not identified as priority areas, by either the irreplaceability or the Minset output map, do not necessarily have no biodiversity value.

The TSCP differs from the 2007 C-Plan (Table 3-1). The planning units differ as the C-Plan uses Grid cells. The TSCP uses watersheds to determine the planning units, better reflecting topography and aspect, thus more suitable for biodiversity (Escott, 2011). This watershed approach also makes allowance for ecological processes. The size of the planning unit also differ as the TSCP has a higher resolution than the 2007 C-Plan. In the TSCP a new decision support layer is used, accounting for fragmentation and condition (based on proximity to settlements). In the updated TSCP the following were assessed by EKZWN: macro ecological processes, agricultural potential, combined minimum patch size and degradation to determine priority conservation areas (Escott, 2011). These differences are a significant component of the current research in answering objective three which is to review and highlight in a GIS environment the potential differences in the KZN C-Plan (2007) and the updated TSCP (2010) datasets to verify current biodiversity stewardship site suitability, and to understand the implications of the site suitability for meeting grassland conservation objectives.

Table 3-1: Key differences between 2007 C-Plan and 2010 TSCP

Systematic Conservation Plan of KwaZulu-Natal	2007 C-Plan	2010 TSCP
Planning Unit	Grid cells	Polygon (based on watershed, better reflecting topography and aspect).
Resolution	2 by 2km grid cells	Smaller polygons average size 45 hectares, smaller planning unit improving resolution
Land cover data used	NLC 2000 v1.2	2005 v2 Landcover
Data sources	Provincial and national protected areas of the province National Vegetation Map (December 2003) Forests of KZN Wetlands of KZN Biophysical data Species distributions from EKZWN	Most of data incorporated has been updated and additional taxon incorporated.
Decision support layers used		New decision support layer used, accounting for fragmentation and condition (based on proximity to settlements)

Irreplaceability and Minset are used in the TSCP to identify Biodiversity Priority Areas. The Minset selects sites based on the minimum optimum that will best meet conservation targets outlined by the user (Escott, 2011). Irreplaceability is determined for specific biodiversity features that the user selects and this is done in the C-Plan software. For example, if there is a species that is endangered it will carry a high irreplaceability value and therefore if it falls within a specific area, then that area has a high irreplaceability value or is totally irreplaceable. The final output is then an irreplaceability map (Escott, 2011). Forming part of SCP, the TSCP can be used in conjunction with other spatial planning mechanisms such as the PAES of KZN (Escott, 2011).

3.2.2 KwaZulu-Natal protected area expansion strategy

According to McCann (2011), the PA targets in the next 20 years stipulate that KZN should contribute approximately 9% of the province's area to PA expansion. The PAES of KZN is based on the priority areas in terms of transformation area avoidance, areas of high irreplaceability, threat avoidance and NPAES alignment. The PAES of KZN also places focus on more urgent conservation dependant biomes such as the grassland biome. Targets for PAES for KZN biomes are outlined below (Table 3-2). The grassland biome requires a further 386,343 hectares to be declared under formal protection (McCann, 2011). The Savanna biome also needs a further 353,855 hectares to be declared under formal protection. The Azonal Vegetation and Forest biome only require a further 9,915 hectares and 19,928 hectares respectively (McCann, 2011). The total area in KZN required to be declared under formal protection is 849,627 hectares (McCann, 2011).

Table 3-2: Protected area expansion strategy targets for KwaZulu-Natal (McCann, 2011)

Biome	Area (ha)	% of total
Grassland	386,343	45.5
Savanna	353,855	41.7
Coastal Belt	78,374	9.2
Forest	19,928	2.3
Azonal Vegetation	9,915	1.2
Water bodies	1182	0.1
Total	849,627	100

KZN has an extremely diverse landscape. The grassland biome has one of the highest diversities in South Africa; it is also characterised by a number of rare and endangered species (Martingale, 2007). Grasslands are found primarily across the central plateau but also inland, and these inland areas fall under the KZN boundaries.

Millions of hectares need to be protected to ensure prevalence of biodiversity within the province, however, the land which falls under priority areas is usually privately owned land and faces serious threats and

pressures from other land uses (Abdu-Raheem, 2010; Cadman et al., 2010). The rapid rate of degradation and transformation and the inability of securing new land for formal conservation is a real threat to securing a representative sample of biodiversity. Lacking in resources, personnel and budget, it is in EKZNW's best interest to have strategic partnerships with landowners (EKZNW, 2009).

3.2.3 Biodiversity stewardship in KwaZulu-Natal

Using the Western Cape's CapeNature as a blueprint, EKZNW developed a stewardship programme that secured a legal back up and offered various benefits and incentives for landowners to enter into formal conservation (EKZNW, 2009; Abdu-Raheem, 2010; Cadman et al., 2010). The idea behind the biodiversity stewardship programme was a win-win situation. The landowner would be offered a number of incentives and the costs incurred to commit to conservation were absorbed by EKZNW, thus the biodiversity within the land would be managed by the landowner and secured (EKZNW, 2009).

Biodiversity stewardship in KZN promotes appropriate management of land use activities. Improving management within the stewardship sites will maintain the viability for species through alien plant clearing, correct fire management, rehabilitation of soil erosion, training of staff and site security in terms of legal standing (EKZNW, 2009).

To date, KZN has many successful biodiversity stewardship sites declared under the NEM: PAA including the Dalton Private Nature Reserve (2383ha) and the Zululand Rhino Reserves (18, 429 hectares) (McCann, 2011) (Table 3-3). Other areas in KZN which have been declared as Nature Reserves include Roselands Nature Reserve, Bill Barnes Crane and Oribi Nature Reserve, and Mount Gilboa Nature Reserve, to name a few. These areas contribute just over 22, 000 hectares to formal conservation, and this is not even including the other biodiversity agreements and protected environments contribution (McCann, 2011). Nature Reserves which are in the process of being declared under NEM: PAA, having had biodiversity stewardship as the driving mechanism, include a further 13, 000 hectares (McCann, 2011).

Table 3-3: The protected areas in KwaZulu-Natal declared under NEM: PAA (Section 23) through biodiversity stewardship (McCann, 2011)

Protected Area	Area (ha)	Declared under NEM:PA Act (Section 23)	Mechanism
Dalton Private Nature Reserve	2,383	Nature Reserve	Biodiversity Stewardship
Zululand Rhino Reserve	18,429	Nature Reserve	Biodiversity Stewardship
Bill Barnes Crane and Oribi Nature Reserve	450	Nature Reserve	Biodiversity Stewardship
Mt. Gilboa Nature Reserve	725	Nature Reserve	Biodiversity Stewardship
Roselands Nature Reserve	412	Nature Reserve	Biodiversity Stewardship
TOTAL	22,399		

Not only do the biodiversity sites contribute land in terms of hectares and habitats for pertinent biodiversity features, they contribute to corridor expansion (Figure 3-2). These sites promote a north-south connection and major altitudinal gradients (Bourne, 2011). These altitudinal gradients and north-south and east-west connections allow species movement in response to climate variability, species are thus able to adapt to changing conditions (Bourne, 2011). The altitudinal gradients, north-south and east-west connections strongly align with the principle of ecological connectivity of SCP. Forest patches, linking watersheds and areas acting as a stepping-stone (refugia) are all important to climate change (EKZNW, 2009). Biodiversity stewardship enables the securing of land that is large enough to allow ecological processes, and incorporating sites that have the potential for corridor formation (EKZNW, 2009). Biodiversity stewardship encourages landowners to partake in land use activities that will allow species to persist or be able to migrate.

Numerous biodiversity stewardship pilot sites play an integral role in corridor formation (Figure 3-2). The Zululand Rhino Nature Reserve forms part of a vital north-south corridor in northern KZN, the Dalton Private Nature Reserve in western KZN plays an integral role in corridor formation in the grassland biome (Figure 3-2). The Umgano Biodiversity Management Agreement site (hereafter Umgano) is pivotal for corridor formation; it is identified as important due to its relative size and its rich biodiversity (Figure 3-2).

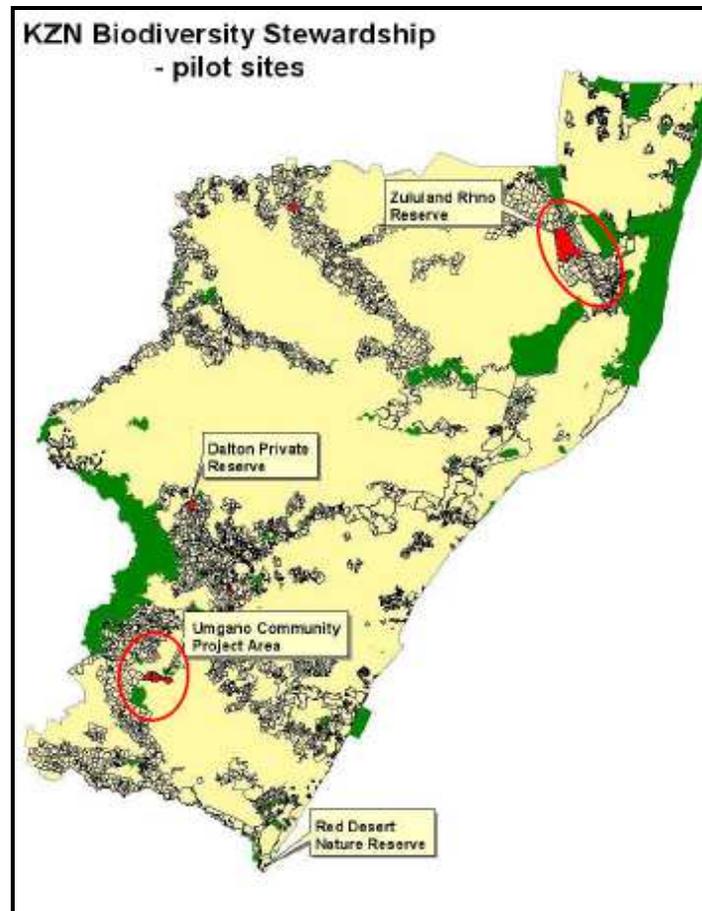


Figure 3-2: Biodiversity stewardship sites playing a major role in corridor development in KwaZulu-Natal (EKZWN, 2009)

Biodiversity stewardship in KZN has been successful in promoting conservation management of land outside PAs and actively securing land under formal protection; making this possible is the meticulous and data driven process.

The biodiversity stewardship process

In Chapter Two, with specific focus on South Africa, the literature broadly examined the characteristics and principles, the roles and responsibilities, the national legislation and policy guiding biodiversity stewardship; the different categories of biodiversity stewardship; and biodiversity stewardship practice in other provinces. In this section the EKZWN process of entering into the biodiversity stewardship programme is documented. Achieving biodiversity stewardship involves a number of different steps. For the highest categories of biodiversity stewardship, Protected Environments and Nature Reserves, the process is described below.

Provincial and local priority areas are identified in systematic conservation plans (Cadman et al., 2010). Although it is the best possible practice for biodiversity stewardship to fall within these priority areas, other factors should also be considered if they do not fall within the priority areas (BSSA, 2009; McCann, 2011).

Including, existing conservation initiatives and the proximity to other conservation areas, the size of the property and the threats associated with that property (BSSA, 2009; McCann, 2011).

Landowner consultation

The selection of sites can be undertaken in two different ways: landowners approach the conservation authority to determine if their land falls within biodiversity priority areas, or the conservation authority can approach landowners who have important biodiversity features (BSSA, 2009; Olivier, 2011; Hayward, 2011). Interaction with the landowners involved is the next step after spatially identifying pertinent areas. Information regarding the site and all applicable aspects related to biodiversity stewardship should be gathered (McCann, 2011). The attitude and needs of the landowners are assessed giving an idea of the commitment to conservation, the obstacles they face and how they will best fit into biodiversity stewardship (BSSA, 2009; McCann, 2011).

The stewardship options are presented to the landowner and the landowner considers the various options (BSSA, 2009). The importance of threatened vegetation types and the biodiversity value of their property are stressed to the landowner. Long-term thinking towards conservation is promoted (BSSA, 2009; McCann, 2011). The background and limitations of previous stewardship programmes are discussed to keep the landowner informed of possible outcomes (BSSA, 2009; McCann, 2011). The limitations in terms of capacity and availability of resources are explained to the landowner (BSSA, 2009). The fears of the landowner should be addressed upfront, such as political instability. It must be stressed that stewardship is not a strategy for land expropriation and the landowner will retain all the rights to the land (BSSA, 2009; McCann, 2011; Olivier, 2011).

Site Assessments

Once the landowners have been engaged, site assessments and reviews of the assessments are undertaken; suggestions are then made as to which categories and options are available to the landowner (Cadman et al., 2010). According to BSSA (2009), biodiversity assessments are carried out by both the Biodiversity Stewardship Programme: Desktop Assessments (BSP: DA) and the Biodiversity Stewardship Programme: Field Assessment (BSP: FA), and both assessments should complement each other. These assessments aim to: i) establish the preferred biodiversity stewardship category and ii) identify key management objectives from an early stage (Reeves and Marom, 2009). The BSP: DA involves a spatial analysis and evaluation of biodiversity value and ecological processes, while the BSP: FA is in place to ground truth the findings of the BSP: DA and collect any additional information. A simple scoring system developed by EKZNW used in the BSP: DA to guide the assessors in determining the biodiversity value of the biodiversity stewardship site, is summarised below (Figure 3-3) (McCann, 2011). The reason for using such a system is to ensure repeatability and transparency when selecting biodiversity stewardship sites and deciding on their protection status. The scoring systems identify a number of different factors all contributing to the validity of the site for biodiversity conservation.

The habitats are examined against their ecosystem status, those carrying a more vulnerable or critical status score higher in the matrix (Figure 3-3). This is significant for grasslands as they generally carry a vulnerable or critical state meaning they score higher based on the matrix. The degree of fragmentation, ecosystem condition and potential for rehabilitation are also rated in the matrix (Figure 3-3). Species which are priority species, IUCN Red list species, endemic species and species with high recovery rates score higher in the matrix all contributing to the final score which will determine the category most suited for the property (Figure 3-4). The ecological processes are also scored according to the matrix; properties that are larger in size, with higher habitat heterogeneity, showing greater altitudinal gradients and corridor or buffer potential, will receive higher ratings contributing to a higher overall score (Figure 3-4).

INDICATOR SCORING		0	1	2	3	4	5
HABITATS	Ecosystem status	Other	LC	NT	V	E	CE
	Degree of fragmentation (of natural areas)	-	Very High	High	Moderate	Low	Very Low
	Ecosystem condition	-	Poor (BI 1)	Reasonable (BI 2)	Good (BI 3)	Very Good (BI 4)	Excellent (BI 5)
	Potential for rehabilitation	None	Poor	Reasonable	Good	Very Good	Excellent
SPECIES	KZN Priority species (see additional doc for list of species)	None	*Nice to monitored and reported on	↔	Species may be monitored and reported on	↔	Species must be monitored and reported on
	RD species (Viable population)	Other	Rare or other RD category	NT	V	E	CE
	Endemism (KZN endemics incl. Near-endemics)	-	1 SA	≥ 3 SA	1 KZN / ≥ 5 SA	≥ 3 KZN	≥ 5 KZN
	Species recovery (summed irreplacability for modeled distribution)	-	Very low	Low	Moderate	High	Very high
ECOLOGICAL PROCESSES	Habitat heterogeneity	-	Low 1 habitat	↔	Moderate 2 habitats	↔	High ≥ 3 habitats
	Property size	-	<100ha	100-500ha	500-1000ha	1000-5000ha	> 5000ha
	Altitudinal gradient	-	<100m	100-200m	200-300m	300-400m	> 400m
	Corridors (stepping stones)	-	Outside	-	-	-	Within
	Buffer / consolidation / PA expansion	-	None	None	Buffer	Consolidation	PA exp
	Ecological Processes - minimum size (based on priority species or vegetation type scale - Table 1 & 2)	-	Very small	Small	Medium (MINIMUM)	Large	Very large
ECOSYSTEM SERVICES	Benefit availability	None	Poor (0-19%)	Reasonable (20-39%)	Good (40-59%)	Very Good (60-79%)	Excellent (80-100%)
	User demand	No users	Very low	Low	Moderate	High	Very high

Figure 3-3: Scoring matrix for proposed biodiversity stewardship site (McCann, 2011)

The scores for the habitat, species, ecosystem processes and EGS are out of a total of 5. These scores are added together and a final score out of 20 is calculated. From the final score out of 20 ascertained from the matrix scoring system described above, the level of protection for the site, in terms of Nature Reserve, Protected Environment, Biodiversity Management Agreement, or Conservation Area, can be determined (Figure 3-4).

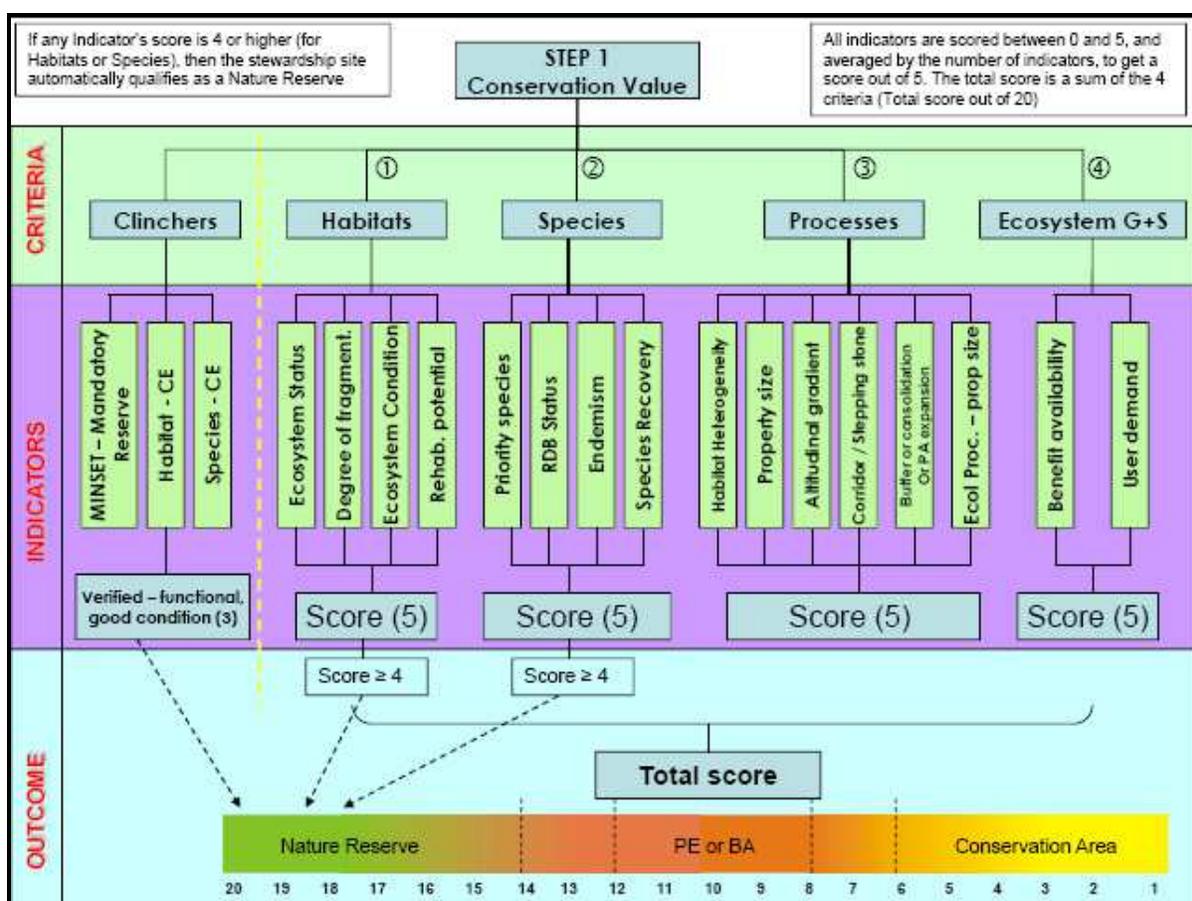


Figure 3-4: Scoring system to determine the category of protection for proposed stewardship site (McCann, 2011)

From these assessments, it will be determined whether the site is suitable for the biodiversity stewardship programme and at what level (BSSA, 2009; McCann, 2011). A management plan for the proposed site can also be considered at this stage. The site assessments are conducted by a number of pertinent stakeholders, usually the stewardship facilitator, the landowner, ecologists, Department of Agriculture (DoA) staff for possible Veld Condition Assessments (VCAs) and other relevant NGOs (BSSA, 2009; McCann, 2011). VCAs can be undertaken for biodiversity stewardship sites, which then render well-informed management plans (Botha, 2009). After all the assessments, the findings are presented to a review panel of specialists.

Report-back

Once the review process has been completed, the outcomes can be presented to the landowner; the way in which the decision was arrived at is explained to the landowner, ensuring transparency (BSSA, 2009). The landowner can then make a decision as to which agreement they would like to enter into. Once this is done, cost calculations and negotiations can begin. Key management objectives can be determined; these will relate to the greatest threats to biodiversity at the site (BSSA, 2009; McCann et al., 2010).

Management plans

The management plan that is drawn up for the biodiversity stewardship site is drafted in terms of NEM: PAA. There are a number of different principles. The management plans should be applicable and well coordinated, and the planning and costing must have an implementation process defined (BSSA, 2009; Olivier, 2011). Some key management objectives include IAS control and the strict rotating regimes for grazing of livestock (McCann, 2011). An estimate of costs of the management objectives also needs to be taken into account and, where possible, other agencies should be utilised such as NGOs (BSSA, 2009).

Proclamation

The actual process of proclamation is outlined by BSSA (2009), where a Notarial agreement that is a form of power of attorney has to be signed by the landowner, conservation agency and the MEC. This contract is prepared by the head office and it should outline the satisfaction with the management agreement (BSSA, 2009; Reeves and Marom, 2009). The notice to declare a PA also has to be published in a national newspaper, and this is paid for by the conservation agency (BSSA, 2009; McCann, 2011). Additionally, the final management agreement for the PA should be signed at the same time (BSSA, 2009). The local municipalities need to be informed of the proclamation of a PA, in a letter informing the local municipalities of the intention to submit, including the possible exclusion from rates and re-zoning of the property into the appropriate conservation zoning (BSSA, 2009). The public participation is required in terms of NEM: PAA. The various requirements suggest that the surrounding landowners give a letter of support, proof of the consultation with affected landowners within the area as well as proof of notice from the local farmers associations which should be documented (BSSA, 2009; Reeves and Marom, 2009).

The MEC must publish the intent to issue notice in two national newspapers, and a copy of the proposed notice should be sent by mail to each of the landowners within the area to be declared (BSSA, 2009). Any objections should be in the form of a written submission to the MEC, barring some circumstances whereby an oral objection can be accepted (BSSA, 2009). Once all the applications and recommendations from the conservation agency are received, the MEC evaluates all the material and makes a decision (BSSA, 2009; Reeves and Marom, 2009).

The publication of the property proclamation in the government gazette takes place once the MEC's signature is obtained; the final proclamation happens at this point when it is published (BSSA, 2009). Once the Protected Area Management Agreement comes into effect, the notarial deeds should be registered with the Notary Public; this will in turn have the restrictions registered against the title deeds (BSSA, 2009; Reeves and Marom, 2009).

Follow up and Support

The final stage of stewardship is the follow up and support, as well as auditing for the PA (BSSA, 2009; Reeves and Marom, 2009; McCann, 2011). This is the most important phase as real protection and adequate

management should be practised (BSSA, 2009). The commitments that were made by the agency and landowner now need to be achieved, and constant contact should be kept (BSSA, 2009 Reeves and Marom, 2009). All efforts that were put in to drawing up the management strategy should be followed through. “A fundamental principle of the Stewardship Programme is to establish well managed sites where the biodiversity status is not jeopardised by neglect or bad management a number of years down the line” (BSSA, 2009:26). Annual reviews regarding the reaching of objectives in the management plan should be conducted, and the achievements and outstanding management actions can be identified.

Concluding Remarks

The process of evaluating the contribution of the land to biodiversity and ecological processes is imperative in the biodiversity stewardship procedure. This meticulous scoring system ensures that appropriate conservation measures are put into place for the management of the land in question.

The process of stewardship outlined above is the general process that the provincial conservation authorities are adopting. KZN has been a lead agent in adopting and developing biodiversity stewardship. The Protected Environment and Nature Reserve categories of biodiversity stewardship complement the existing KZN and national PA network, and the CA and BMA categories aid in sustainable use of resources and mainstreaming biodiversity conservation into productive sectors.

Biodiversity stewardship plays an important role in conservation of the different biomes of South Africa. As stated previously, one of the most poorly conserved biomes is the grassland biome. The grassland biome is also extensively used in agriculture for grazing, so a tool such as biodiversity stewardship could prove to be a key mechanism for achieving biodiversity conservation of the grassland biome. To understand and document the role biodiversity stewardship plays in grassland conservation, a case study analysis of three biodiversity stewardship case study sites is undertaken. The case studies are used to assess how biodiversity stewardship functions and weighs up as a conservation tool.

3.3 Grassland biodiversity stewardship case study sites in KwaZulu-Natal

The broad research setting is in KwaZulu-Natal (KZN) with a particular focus on three sites namely Roselands Nature Reserve in Richmond, Bill Barnes Crane and Oribi Nature Reserve in Nottingham Road and Umgano in Umzimkhulu (Figure 3-5).

All the case study sites were rigorously assessed by EKZNW. The case study sites were proclaimed under the biodiversity stewardship programme precisely because they contribute to targets. Examining the case study sites and gleaning out the information that pertains specifically to grasslands enables a better understanding of the role the case study sites play in meeting grassland conservation objectives. As the focus of the research is to understand the contribution the case study sites play in grassland conservation, it is significant that all case study sites have the grassland biome as the primary biome. Accessibility to the sites

and access to information and documentation relating to the sites, as made available by EKZNW, was also a strong reason for choosing these sites for investigation.

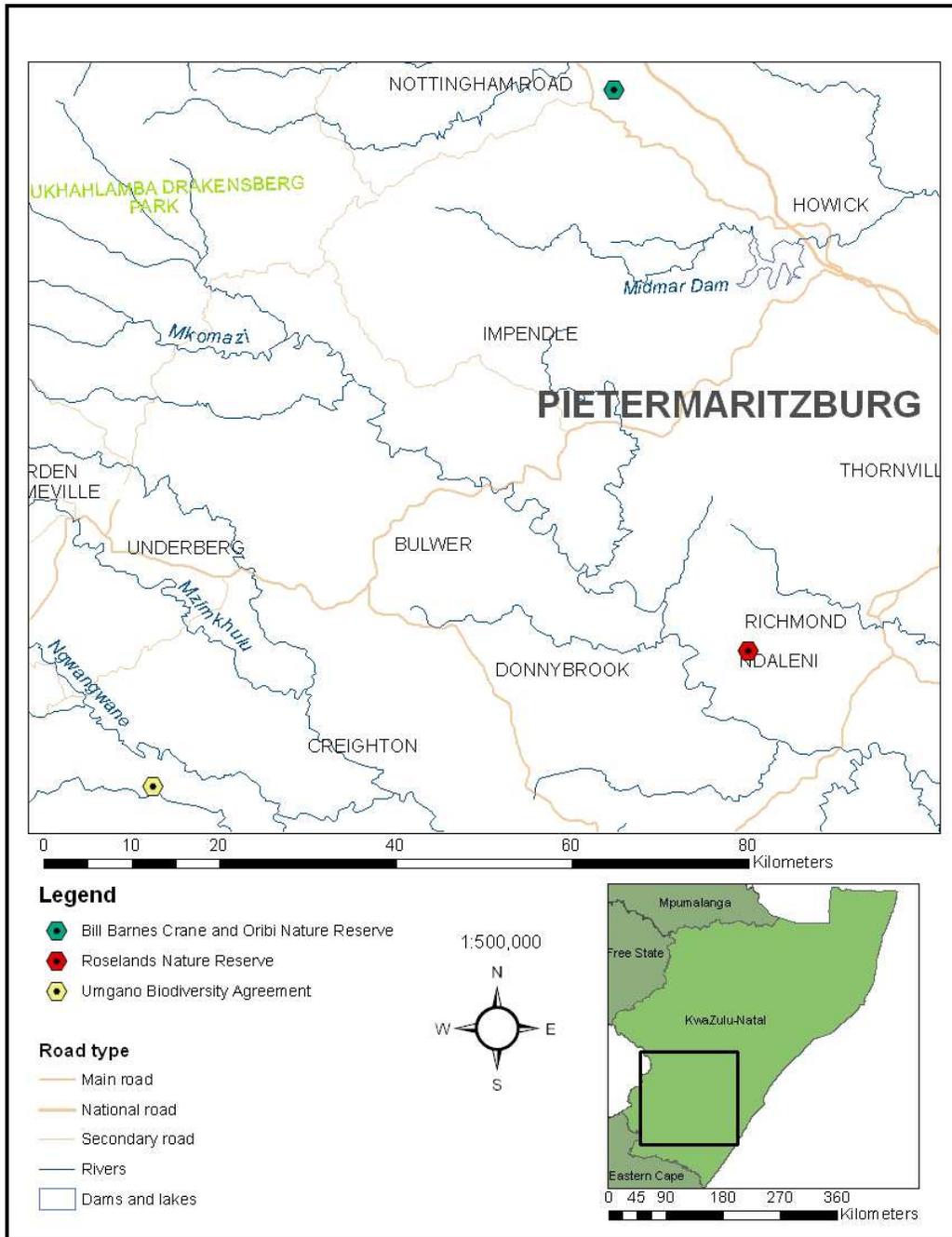


Figure 3-5: Study area, representing the biodiversity stewardship case sites selected in KwaZulu-Natal

As discussed above, the EKZNW BSP: DA and BSP: FA (hereafter referred to as the BSP documentation) undertaken for each biodiversity stewardship site are extensive. The objective of the BSP documentation is to determine the biodiversity value of the proposed stewardship area and its potential at achieving targets using spatial information (EKZNW, 2007a). The contribution of the case study sites to conservation targets

is a primary reason the site was declared for conservation under stewardship. Gleaning out information that pertains specifically to grasslands enables the understanding of the role the sites play in meeting grassland conservation objectives. This speaks directly to answering objective two of the research. For the purpose of this research, grasslands were singled out from the BSP documentation.

The BSP documentation undertaken by EKZNW for all potential biodiversity stewardship sites assesses and gauges the following:

- The ecosystem status of the vegetation types within the biodiversity stewardship site;
- The contribution of the vegetation within the biodiversity stewardship to vegetation targets;
- Whether the biodiversity stewardship site compliment existing PAs, and if there is potential for corridor formation;
- The transformation, fragmentation and degraded areas within the biodiversity stewardship site;
- Irreplaceability from the 2007 C-Plan for the biodiversity stewardship site, species driving the irreplaceability;
- Rare and endangered species occurring within the biodiversity stewardship site;
- Ecosystem processes: altitudinal changes and functional wetlands;
- Alien invasive occurrence and severity on the biodiversity stewardship site;
- Threats to biodiversity such as grazing, fire, mowing and soil erosion.

Roselands Nature Reserve

Roselands farm is 1,152 hectares in size and is located in the Richmond region in KwaZulu-Natal Province (Figure 3-5). Within this, the Roselands Nature Reserve biodiversity stewardship site is 412ha. The Roselands farm has been in the family for a number of generations (Respondent K, pers. com., 2011). The different farming practices that occur on the farm include beef, haymaking, sugar cane growing, kiwi fruit production and a game reserve (Respondent K, pers. com., 2011). In the late 1970s, Roselands farm became part of the National Heritage; this was driven by the nesting sites of Blue Swallows (*Hirundo atrocaerule*). However, the National Heritage system collapsed and conservation on the farm was not acknowledged; despite this, Roselands farm encapsulates a number of different biodiverse features (Respondent K, pers. com., 2011).

In 2007, the owners of Roselands farm were approached by EKZNW to enter into the biodiversity stewardship programme (EKZNW, 2007a; Respondent K, pers. com., 2011). Biodiversity stewardship was

seen as a good option as the land would be formally protected and the incentives in terms of tax rebates were appealing (Respondent K, pers. com., 2011). The advice and support offered by EKZNW was also an attractive quality (Respondent K, pers. com., 2011). On 15 July 2010, 412 hectares of the Roselands farm was formally declared as a Nature Reserve under the NEM: PA (Section 23), the mechanism for proclamation was biodiversity stewardship (Respondent K, pers. com., 2011).

The Roselands Nature Reserve forms part of a macro ecological corridor (KZN Bioregional Conservation Plan) (EKZNW, 2007a). In relation to PAs and areas of high conservation value, the Roselands Nature Reserve is to the north west of the Soada Forest Nature Reserve only about 3.5 km away. The Roselands Nature Reserve is not identified as a priority area for the EKZNW PAES (EKZNW, 2007a).

According to the BSP documentation, the Roselands Nature Reserve contributes approximately 0.2% to the five-year KZN PA target and approximately 0.05% to the twenty-year KZN PA target (EKZNW, 2007a; McCann, 2011). According to the BSP documentation, the Roselands Nature Reserve contains both endangered (E) and vulnerable (V) ecosystems (EKZNW, 2007a). The endangered ecosystems include the Midlands Mistbelt Grassland where only 0.6% is formally conserved in national PAs; it is thus classified as hardly protected (EKZNW, 2007a; Mucina and Rutherford, 2006). The Roselands Nature Reserve contributes 161 hectares (0.12%) to the national PA target of the Midlands Mistbelt Grassland vegetation type (EKZNW, 2007a) (Table 3-4). The poorly protected and endangered Southern Moist Grassland has only 3.1% in formally conserved in PAs in South Africa. According to the BSP documentation, the Roselands Nature Reserve site contributes 14 hectares (0.02%) to the national PA target for the Southern Moist Grassland vegetation type (EKZNW, 2007a; Table 3-4). The vulnerable ecosystem contained within Roselands Nature Reserve is the Eastern Valley Bushveld and the Roselands Nature Reserve contributes 221 hectares, 0.52% to the national PA target of the Eastern Valley Bushveld vegetation type. Additionally, the Least Threatened (LT) ecosystem contained in the Roselands Nature Reserve is the Southern Mistbelt Forest that contributes 18 hectares, 0.43% to the national PA target of the Southern Mistbelt Forest vegetation type (EKZNW, 2007a).

Table 3-4: Vegetation types occurring within Roselands Nature Reserve (adapted from EKZNW, 2007a)

Vegetation type	NSBA Ecosystem Status	Conserved in formal national PA (%)	Protection level (Mucina and Rutherford, 2006)	National PA target of vegetation type (ha)	Extent of vegetation contained within the property (ha)	Contribution of biodiversity stewardship site to national PA target of vegetation type (%)
Midlands Mistbelt Grassland	E	0.6	Hardly protected	130,225	161	0.12
Southern KZN Moist Grassland	E	3.1	Poorly protected	55,257	14	0.02
Eastern Valley Bushveld	V	0.1	Hardly protected	51,861	221	0.52
Southern Mistbelt Forest	LT	15	Poorly protected	2,484	18	0.43

The BSP: DA identified the Roselands Nature Reserve as a ‘Mandatory Reserve’; this was in terms of the 2007 C-Plan and this was due to its high irreplaceability (EKZNW, 2007a). The irreplaceability as identified by the BSP: DA was more than two thirds of the property (EKZNW, 2007a). The irreplaceability is driven by the Blue Swallow (*Hirundo atrocaerule*) (CE), the millipede (*Centrobolus lawrencei*) (CE), the Hilton Daisy (*Gerbera aurantica*) (V) and the Oribi buck (*Ourebia ourebi*) (E) (EKZNW, 2007a).

The Roselands Nature Reserve is approximately 64% transformed due to sugar cane and plantations (EKZNW, 2007a) (Table 3-5). Plantations also form a barrier to natural process. The Roselands Nature Reserve also has various wetlands; however, many of them are also transformed and heavily impacted on by the sugar cane and grazing farming practices (EKZNW, 2007a). Alien invasive species are regarded as being of low severity and where black wattle (*Acacia mearnsii*), American bramble (*Rubus cuneifolius*) and eucalyptus (*Eucalyptus globulus*) are apparent, the invasions occur mainly along the roads and water courses (EKZNW, 2007a).

Table 3-5: Roselands farm biodiversity value, ecosystem processes, land use pressures, context, and location (EKZNW, 2007a)

Determinants of conservation significance	Site characteristics
Irreplaceability	768ha of high irreplaceability (0.67-1) 384ha of low irreplaceability (0-0.33)
Species of concern	Blue Swallow (<i>Hirundo atrocaerule</i>) (CE) Millipede (<i>Centrobolus lawrencei</i>) (CE) Hilton Daisy (<i>Gerbera aurantica</i>) (V) Oribi buck (<i>Ourebia ourebi</i>) (E)
Ecosystem process and services	Elevation drop 400m from 1,200m (interface between grassland and valley bushveld) Various wetlands (may need rehabilitation)
Transformation	Irreversible transformation by plantations and sugarcane 738 (64%) 10ha degraded (1%)
Adjacent land use (barriers to natural processes)	Plantations
Relation to PA or areas of conservation value	Near Soada Forest Nature Reserve (3.5km) Not identified in EKZNW PA expansion plan Could link with other important Blue Swallow (<i>Hirundo atrocaerule</i>) (CE) breeding sites.
Threats	Black wattle (<i>Acacia mearnsii</i>) American bramble (<i>Rubus cuneifolius</i>) Eucalyptus (<i>Eucalyptus globulus</i>)

Prior to biodiversity stewardship, the Roselands Nature Reserve did not have a written management plan (EKZNW, 2007a). It was identified that although the stewardship site would still have mowing and grazing of the grasslands, it would have to be done in a controlled manner. The management plan of Roselands Nature Reserve aligns with conservation principles and addresses burning and grazing management, IAS control and fencing.

A Veld Condition Assessment (VCA) was conducted by Botha (2008) and the veld condition for Roselands Nature Reserve was found to be moderate to good, and the weighted average of the veld condition was 62.9%. From the VCA a detailed and complete management plan was drawn up for the grasslands of Roselands Nature Reserve.

The development potential of the Roselands Nature Reserve was also assessed, as well as the intention to sell. As the landowner had no intention to develop or sell, site security was ensured.

Bill Barnes Crane and Oribi Nature Reserve

The Bill Barnes Crane and Oribi Nature Reserve (BBCONR) is located in the Nottingham Road district, KwaZulu-Natal (EKZNW, 2007b) (Figure 3-5). It is 449.7 hectares in size; contributing approximately 0.2% to the five-year KZN PA target and 0.05% to the twenty-year KZN PA target (EKZNW, 2007b; McCann, 2011). The BBCONR, initially managed by the KwaZulu-Natal Crane foundation, was known as the Usher Conservation Centre. The Usher conservation centre was a grassland and wetland sanctuary for all three crane species: Wattled Crane (*Grus carunculatu*) (CE), Blue Crane (*Anthropoides paradiseu*) (V), Grey Crowned Crane (*Balearica reguloru*) (V), and other species of significance such as the Oribi buck (*Ourebia ourebi*) (E) (Respondent J, pers. com., 2011).

The farmers surrounding the Usher conservation centre wanted to donate land for the conservation of grasslands and fauna and flora and for the aesthetic value (Respondent J, pers. com., 2011). Three donors made vital contributions and signed a founding agreement that reserved the right of the landowners to make hay, burn and graze the land. The three farmers agreed to undertake their farming practices on the land in a conservative way: there would be no ploughing and no planting of crops (Respondent J, pers. com., 2011). The Bill Barnes Crane and Oribi Nature Reserve was formally declared under the NEM: PA Act (Section 23) as a Nature Reserve on 15 January 2009, the mechanism for proclamation was biodiversity stewardship (Respondent J, pers. com., 2011).

The vegetation that occurs at BBCONR as identified by the BSP: DA is the Drakensberg Foothill Moist Grassland that is classified as vulnerable (V) (EKZNW, 2007b; Mucina and Rutherford). The entire property is classified as Drakensberg Foothill Moist Grassland. Only 4.2% is formally conserved in national PAs, consequently it is classified as poorly protected (Table 3-6). BBCONR contributes 449.7 hectares, 0.37% to the total national PA target for the Drakensberg Foothill Moist Grassland vegetation (EKZNW, 2007b) (Table 3-6).

The 2007 C-Plan also indicates that the whole BBCONR is classified as a 'Mandatory Reserve' (EKZNW, 2007b). The entire BBCONR was identified as having an irreplaceability of one; the entire property was irreplaceable (EKZNW, 2007b). The species influencing the high irreplaceability include Wattled Crane (*Grus carunculatu*) (CE), Oribi (*Ourebia ourebi*) (E) and the Natal Midlands Dwarf Chameleon (*Bradypodium thamnobates*) (E) (EKZNW, 2007b).

BBCONR is not included as a priority area in terms of the EKZNW PAES, the nearest PA is Fort Nottingham that is approximately nine kilometres away to the south west, and the distance is too great to form a buffer or corridor for Fort Nottingham.

Table 3-6: Vegetation types occurring within Bill Barnes Crane and Oribi Nature Reserve (adapted from EKZNW, 2007b)

Vegetation type	NSBA Ecosystem Status	Conserved in formal national PA (%)	Protection level (Mucina and Rutherford, 2006)	National PA target of vegetation type (ha)	Extent of vegetation contained within the property (ha)	Contribution of biodiversity stewardship site to national PA target of vegetation type (%)
Drakensberg Foothill Moist grassland	V	4.2	Poorly protected	120,630	449.7	0.37

In terms of contribution to local scale ecological processes and ecosystem services, the BBCONR provides a habitat for a number of different species in particular a breeding habitat for crane pairs (EKZNW, 2007b). The wetland that exists on the BBCONR is a palustrine wetland system that does not have flowing water, the function of the wetland is vitally important for water retention and purification. BBCONR forms part of the Mooi River catchment and plays a key ecological role in terms of wetland functions of regulation and retention of water (EKZNW, 2007b). Additional ecological process which the BBCONR contribute to the broad landscape include a fire maintained ecosystem as well as acting as a corridor for the Berg to Thornveld (EKZNW, 2007b). In terms of the 2007 C-Plan, BBCONR falls within a macro ecological corridor identified in the KZN biodiversity spatial framework (EKZNW, 2007b). According to the BSP documentation, BBCONR falls within one of the macro-ecological corridors as identified in the KZN SDF (EKZNW, 2007b).

Transformation of the BBCONR was identified by EKZNW (2007b) to be a dam, quarry, farm buildings and alien plants contributing to approximately 2% of the entire property. There is extensive transformation in the surrounding areas of BBCONR; this can be owed to the highly commercial cropland. Alien invasion is considered low: some invaders include black wattle (*Acacia mearnsii*), American bramble (*Rubus cuneifolius*), pine trees (*Pinus species*) and eucalyptus (*Eucalyptus globulus*) (EKZNW, 2007b).

The veld condition for BBCONR was considered to range from moderate to excellent (Botha, 2009). The grazing capacities were determined, the grazing capacities varied between the different camps and the capacity for conservation was reduced to 70% of agricultural grazing capacity (Botha, 2009). As the intention was to improve the condition of grasslands, the stocking rate was lower than the capacity of the farm. This is of significance as it is an indication of the role biodiversity stewardship plays in improving grassland conservation and aiding in meeting targets. This speaks directly to answering objective two of the research. For the biodiversity stewardship sites the conservation-stocking rate is slightly lower than the

agricultural rate: this also means, however, less supplementary feed was needed in the winter months (Botha, 2009).

The management objective outlined above was incorporated into the management plan designed for BBCONR. Other management needs related to detailed burning regimes, IAS clearing assistance, and rehabilitation of the degraded wetland and realignment of fencing to adhere to rotational grazing set out by VCA. The development potential of BBCONR was also examined and the owners had no intention of selling and agreed to title deed restrictions (EKZNW, 2007b).

Table 3-7: Bill Barnes Crane and Oribi Nature Reserve biodiversity value, ecosystem processes, land use pressures, context, and location (EKZNW, 2007b)

Determinants of conservation significance	Site characteristics
Irreplaceability	440.4ha of high Irreplaceability (0.67-1)
Ecosystem process and services	Provides a habitat for a breeding habitat for crane pairs. Palustrine wetland system that does not have flowing water, the function of the wetland is vitally important for water retention and purification. Forms part of the Mooi River catchment and plays a key ecological role in terms of wetland functions of regulation and retention of water Fire maintained ecosystem Acting as a corridor for the Berg to Thornveld
Transformation	Dam, quarry, farm buildings and alien plants contributing to approximately 2% of transformation
Adjacent land use (barriers to natural processes)	Agricultural in nature, roads
Relation to PA or areas of conservation value	Approximately 9km southwest is Fort Nottingham (too great to form a buffer or corridor). Falls within a macro ecological corridor identified in the KZN biodiversity spatial framework. Aligns with the KZN SDF.
Threats	Black wattle (<i>Acacia mearnsii</i>) American bramble (<i>Rubus cuneifolius</i>) Eucalyptus (<i>Eucalyptus globulus</i>) Pine trees (<i>Pinus</i> species)

Umgano Biodiversity Management Agreement site

Umgano is located in the Umzimkulu, uKhahlamba district in KwaZulu-Natal; owned by the Mabandla community trust (Figure 3-5). The total area is 5,350 hectares. It was set aside for environmentally sustainable economic upliftment (Bourne, 2011). The Umgano Community Project Area forms part of a broader corridor development, aimed to link with Nsikeni and the Coleford Nature Reserves (Bourne, 2011). The biodiversity stewardship category that is in place is a thirty-year Biodiversity Agreement. A portion of the site is set aside to be declared as a Nature Reserve (Bourne, 2011). Although not formally declared as a Protected Environment or Nature Reserve, the contribution to PA targets is considered by EKZNW. This is done not only to assess its conservation significance but also to determine its potential contribution as there is intention to enter into a higher biodiversity stewardship category. The Mabandla community was approached by EKZNW in 2007 and the management agreement was signed between the community and EKZNW in 2007 (Bourne, 2011).

An endangered vegetation type that the Umgano site encompasses is Southern KZN Moist Grassland (EKZNW, 2007c). Umgano contributes 1,690 hectares, 3.1% to the national PA target for Southern KZN Moist Grassland vegetation target (EKZNW, 2007c) (Table 3-8). The Drakensberg Foothill Moist Grassland and the Eastern Mistbelt Forest are also both vulnerable and will contribute 1.7% and 10.7% respectively to the national PA target for the vegetation types (EKZNW, 2007c).

Although not contributing to formal PA targets, the Umgano site secures significant grassland vegetation types, such as the endangered Southern KZN Moist Grassland and the vulnerable Drakensberg Foothill Moist Grassland are placed under conservation management. The Eastern Mistbelt Forest contained in Umgano is a significant sized area and is important for conserving biodiversity. These endangered and vulnerable vegetation types are well represented in the Umgano site.

Transformation of Umgano is isolated to the plantation zone, transformed by afforestation; however, there are large natural areas still intact (EKZNW, 2007c). The transformation of adjacent property is not too extensive. Identifying the threats to the site is vitally important in setting up management to control and mitigate against the threats. Alien invasive plants also pose a threat; black wattle (*Acacia mearnsii*) is identified as a problem along many of the watercourses.

Despite the transformation and limitations in terms of surrounding land, there is little fragmentation in the natural zones (EKZNW, 2007c). According to the VCA, the weighted average of veld condition for Umgano was 67.2% and was considered moderate to good condition.

The Umgano site is heavily used by the Mabandla community and thus a management plan for the Umgano site was vitally important. At the time of entering into the Biodiversity Agreement the site did not have a management plan, burning was done to favour grazing, grazing was not controlled and the community entered the Umgano area and collected resources with no control (EKZNW, 2007c). The management plan

encompasses IAS control, fire management, medicinal plant collection, firewood collection, and collection of building material, thatch grass collection, subsidence hunting and fishing and illegal grazing and hunting of neighbours (EKZNW, 2007c).

Table 0-1: Vegetation types occurring within Umgano (adapted from EKZNW, 2007c)

Vegetation type	NSBA Ecosystem Status	Conserved in formal PA (%)	Protection level (Mucina and Rutherford, 2006)	PA target of vegetation type (ha)	Area of vegetation contained within the property (ha)	Contribution of biodiversity stewardship site to PA target of vegetation type (%)
Southern KZN Moist Grassland	E	3.1	Poorly protected	55,257	1,690	3.1
Drakensberg Foothill Moist Grassland	V	4.2	Poorly protected	120,630	2,010	1.7
Southern Mistbelt Forest	LT	15	Poorly protected	2,484	265	10.7

The White-winged flufftail (*Sarothrura ayresi*) (CE), Cape Parrot (*Poicephalus artocaerulea*) (E) Southern Ground Hornbill (*Bucorvus leadbeateri*) (V) have all been recorded on the Umgano site (EKZNW, 2007c). There are also a number of species which occur within a 5km radius of the Umgano site: Wattled Crane (*Burgerananus carunculatus*) (CE) and Oribi (*Ourebia ourebi*) (E), to name a few.

Umgano is also in close proximity to several Nature Reserves, namely: Coleford Nature Reserve, iGxalingenwa Nature Reserve, Ntsikeni Nature Reserve and Kwa Yili Nature Reserve (EKZNW, 2007c). The possibility of forming corridors and linking with the other Nature Reserves is high; despite its possibility of being part of a corridor, it does not form part of the NPAES of EKZNW.

In terms of climate change mitigation the Umgano site contains a major altitudinal gradient of 800m, the highest point being 2,000m above sea level and the lowest point being 1,200m above sea level (EKZNW, 2007c). This may allow for migration and dispersal routes along mountain ranges: the low-lying river valleys link to downstream valleys (EKZNW, 2007c). Umgano can also be a seed resource to surrounding areas, and the forest patches can form part of the migration chain between other forest species (EKZNW, 2007c).

Table 0-2: Umgano biodiversity value, ecosystem processes, land use pressures, context, and location (EKZNW, 2007c)

Determinants of conservation significance	Site characteristics
Irreplaceability	1,438ha of low irreplaceability (0-0.33)
Ecosystem process and services	Major altitudinal gradient of 800m (highest point being 2,000m above sea level and the lowest point being 1,200m above sea level). Seed resource to surrounding areas, and the forest patches can form part of the migration chain between other forest species.
Transformation	Approximately 26% transformed by afforestation. Natural areas largely untransformed.
Adjacent Land use (barriers to natural processes)	Cultivated Urban
Relation to PA or areas of conservation value	Close proximity to several Nature Reserves: 5km from Coleford Nature Reserve 1km from iGxalingenwa Nature Reserve 8km from Ntsikeni Nature Reserve 4km from Kwa Yili Nature Reserve
Threats	Black wattle (<i>Acacia mearnsii</i>).

According to the 2007 C-Plan, the Umgano site did not carry high irreplaceability values, however, the impression of the assessors was that the irreplaceability did not reflect the true importance of the site (EKZNW, 2007c). The taxonomic data for the area at the time was poor, and under documented. With improved research it was felt by the assessors that the Umgano site would have greater conservation significance in the updated conservation plan. In terms of 2007 C-Plan the Umgano site did not fall under either a ‘mandatory reserve’ or a ‘negotiated reserve’.

Concluding Remarks

This chapter provides an overview of the status quo of broader conservation planning and provides the researcher with an understanding of the purpose and process of the biodiversity stewardship programme in KZN. It describes the specific case study sites and thus sets the scene for further examining the results that are presented in Chapters Five and Six. The research design and the chosen methods are described in Chapter Four below.

Chapter 4. Methodology

4.1 Introduction

The research methodology is used to answer the aim, to assess the potential for the KwaZulu-Natal biodiversity stewardship programme to contribute towards achieving grassland biome conservation objectives in the province. Chapter One outlines the aim and objectives of the study and introduces its key themes. To answer the aim and objectives, the research examines existing stewardship site assessments and undertakes general GIS operations to understand stewardship site suitability, with a focus on grassland biomes. The research is primarily undertaken within the framework of qualitative research methodology. Qualitative data was gathered from attending workshops and interviewing key stakeholders and subsequently analysed to obtain stakeholder insights into the challenges facing the Biodiversity Stewardship Programme in KZN and South Africa. These stakeholders were also asked to share their perceptions and attitudes on the manner in which implementation prospects of the stewardship programme can be improved to effectively contribute to grassland biome conservation in the province.

In this chapter, the general theory on the methods adopted is presented. This chapter discusses the methods employed in this study to gather, analyse and develop conclusions to answer the aim and objectives which included a number of different techniques and methods, including quantitative (to a limited extent) and qualitative techniques

4.2 Quantitative and qualitative research design

Mouton and Marais (1999) describe quantitative research as research that is more formalised, and its range is highly defined. Quantitative analysis involves the use of data obtained through measurement, and it has an unambiguous meaning (Mouton and Marias, 1993). Quantitative and qualitative data are collected and analysed in different ways, whereby quantitative analysis usually has numerical data as an output so that statistical analysis can be undertaken, while qualitative research has non-numerical forms (Gelo, Braakmann and Benetka, 2008). Quantitative analysis includes mathematical techniques or computer aided studies, and GIS is considered a tool to analyse quantitative data (Mouton, 1998). Historically quantitative data was favoured over qualitative data this was largely due to the positivist paradigm; that everything needs to be quantified in a scientific manner (Durrheim and Painter, 2006). It is often claimed that qualitative methods are too biased; however, today, it is realised qualitative data can tell us a great deal about peoples' perceptions and experiences relating to certain topics (Durrheim and Painter, 2006).

Qualitative research is explorative and descriptive (Niemann, 2005). Qualitative research proves to be in-depth, intensive (which can coincide well with the quantitative methods that are extrusive) (Dwyer and Limb, 2001). Qualitative approaches are procedures, which are not formalised, but more philosophical and prove to be difficult to quantify accurately (Mouton and Marais, 1993; Niemann, 2005). "Qualitative

research designs begin with specific observations and build towards general patterns” (Mouton and Marais, 1993:204).

Data interpretation of qualitative research relies on the creation of meaningful and consistent explanations, drawing from the theoretical framework, and the observations of the phenomena (Gelo et. al, 2008). The interpretation of qualitative data requires the researcher to give meaning to the results and put it into context of the study (Gelo et. al, 2008). Qualitative research aids in the understanding of phenomena and developing data driven hypotheses. Qualitative research emphasises description and not observation; it is therefore very difficult to reject as it is based on opinions and other people’s points of view (Niemann, 2005). An advantage of qualitative research is the ability of the researcher to observe the behaviour of the subject in the natural surroundings enabling the researcher to understand the integrated communication (Niemann, 2005). Qualitative methods are also flexible; the researcher can explore points of interest, allowing the study to be enhanced. Disadvantages to qualitative research include unrepresentative sample sizes and forming incorrect generalisations. Objectivity can be lost due to the quantification of data (Niemann, 2005). Qualitative methods involve the greater understanding of concepts and constructs, and Mouton and Marais (1993) indicate that qualitative studies are richer while quantitative studies are more specific.

It is argued by Mouton (1998) that the most complex and highest level of research is the methodological aspect that includes qualitative and quantitative approaches and techniques (Niemann, 2005). According to Bryman (2006), the integration of quantitative and qualitative techniques is becoming more and more popular in research.

4.2.1 Research methodology design and techniques used

Academic literature, the research questions, the conceptual framework and the knowledge of different techniques influence the research design (Maxwell, 2005). This section describes the theoretical setting behind the methods and techniques utilised in the research. The research design steers the researcher in the collection, analysis and interpretation of the data and observations. The primary research techniques, which are used to extract relevant information, included case study analysis, documentary analysis, GIS operations and semi-structured interviews.

This research is undertaken predominantly within the framework of the qualitative research methodology relying mainly on documentary analysis, case study analysis and semi-structured interviews. The documentary analysis and literature review yielded secondary data and provided the conceptual framework that guided the research. The case study analysis aided in identifying the real-life context of the process and practice of the biodiversity stewardship programme. The semi-structured interviews aided in understanding the implementation prospects of the biodiversity stewardship programme from the perspectives of all the stakeholders involved in stewardship. This enabled the researcher to develop insight into how implementation can be improved.

4.3 Case Study Approach

The case study approach allows the real life context to be examined and investigated, thus depth and quality of data is provided (Cousins et al., 2008). Case studies are pivotal in dealing with explanatory studies, serving as an overall research design and central key themes can be highlighted (Abdu-Raheen, 2010). Case studies are a favoured research design for the understanding of processes not well-studied (Abdu-Raheen, 2010).

Case study research uses both quantitative and qualitative research, with the result that it supplies a holistic approach. A case study approach is used to establish valid and reliable information to improve understanding of a particular subject that is outside the boundaries of existing knowledge (Lubbe, 2003). By examining case studies, the real life context can be established and interactions and perceptions can be obtained illustrating relationships, political issues and recurring patterns (Lubbe, 2003). A case study approach is more in-depth than any other research method and enables the collection of multiple sources of data and a variety of perspectives (Thomas, 2010; Lubbe, 2003). Although case studies are subjective, using multiple sources can prove the validity and reliability of the research (Lubbe, 2003).

4.3.1 Case study methods

For the purpose of the current study, a case study analysis is a suitable research method as biodiversity stewardship is a relatively new concept. The effectiveness of biodiversity stewardship as mechanism for achieving conservation targets is not well documented. A case study analysis was considered the most appropriate methodology to employ as it enabled the reviewing of a wide range of information pertaining to the biodiversity stewardship sites.

As described in Chapter Three above, three case study sites were selected. Each was declared under the biodiversity stewardship process by EKZNW and they all include grassland vegetation as the primary biome. They are Roselands Nature Reserve in Richmond, Bill Barnes Crane and Oribi Nature Reserve in Nottingham Road and Umgano Biodiversity Management Agreement site in Umzimkhulu (Figure 3-5).

Pertinent to the case study analysis is the BSP documentation, which was compiled by EKZNW in 2007 when the case study sites entered into the BSP. Reviewing the BSP documentation aided in answering objective two by providing an overview of the KZN biodiversity stewardship programme and attempting to understand the role it plays in grassland conservation.

4.4 Sampling and data collection

Qualitative research involves sampling a representative population and this can be done through purposive sampling, whereby criteria for the sampling are outlined (Gelo et. al, 2008). Qualitative research is collected to allow in-depth understanding of the perspectives of the participants (Gelo et. al, 2008).

4.4.1 Purposive sampling

The techniques for selecting stakeholders for the semi-structured interviews was undertaken through purposive sampling which gave the researcher control as specific respondents are selected (Barbour, 2001). Purposive sampling is also referred to as selective sampling, where certain elements or incidents are part of the selection of the respondent, and ‘information rich cases’ result in the researcher obtaining a great deal of pertinent information on the specified topic (Burns and Groves, 2005). The reason for purposive sampling in this research was because the respondents selected have extensive knowledge, experience and information that was specific and relevant for the research at hand.

4.4.2 Primary and secondary data collection

Primary data is any data collected by the researcher this is original data. Secondary data is any data collected by someone other than the researcher.

Interview theory

Interviews enable the researcher to gain an in-depth, flexible response from the research participants (Martin and Pavlovskaya, 2010). Interviews are undertaken through direct contact between the researcher and the researched. There are various types of interviews, differing in structure, purpose and method. The semi-structured interview has questions that are open-ended, and the interviewer may prompt the interviewee to challenge, clarify and elaborate on pertinent issues certain to reconceptualise and to establish a particular style of conversing (Corbetta and Patrick, 2003). “They provide greater breadth and depth of information, the opportunity to discover the respondent’s experience and interpretation of reality. And access to people’s ideas, thoughts and memories in their own words rather than in the words of the researcher, but at the cost of reduced ability to make systematic comparisons between interview responses” (Klandermans and Staggenborg, 2002:92).

A semi-structured interview gives both the interviewer and the respondent freedom, while at the same time ensuring that all the relevant themes are dealt with and all the necessary information is collected. Instead of the interview being guided by rules, it is steered by guidelines; this enables absolute flexibility and the interviewer to extract more information than from a structured interview (Corbetta and Patrick, 2003; Klandermans and Staggenborg, 2002).

In conducting semi-structured interviews, the interviewer refers to an outline of topics to be covered during the open-ended conversation (Corbetta and Patrick, 2003). The interviewer controls the questions and is responsible for the wording and the other various topics that are to be dealt with. Semi-structured interviews require active engagement with the interviewee. It is important that the interviewer encourage comprehensive answers (Klandermans and Staggenborg, 2002). The interviewer should construct an interview guide that takes into account the central themes of the research. At the onset of the interview, it is vital for the interviewer to explain the purpose of the interview, the topics that will be covered and what the interviewer would like to obtain from the questions (Klandermans and Staggenborg, 2002).

There are, however, limitations with regard to semi-structured interviews, the research is largely dependent on an interpersonal relationship and the interviewer's listening skills. Further limitations include the ethical and privacy issues concerning protecting the research participants (Martin and Pavlovskaya, 2010). Concerning this point, it is important that the researcher assure confidentiality regarding sensitive discussions; however, there is the risk of omitting significant information (Martin and Pavlovskaya, 2010).

Semi-structured interviews and workshops

The academic literature on biodiversity stewardship was found to be minimal and biodiversity stewardship as a mechanism for achieving conservation objectives in SA has not been thoroughly evaluated. A series of semi-structured interviews were conducted to answer objective four. Key stakeholders were asked to share their perceptions and attitudes on the manner in which implementation prospects of the stewardship programme can be improved. The interview guide included possible questions for the different stakeholders to answer which enabled the researcher to gain insights into the different perspectives on the key research issues and themes. The semi-structured nature of the interviews allowed each stakeholder to offer their insights on these broad thematic areas and then to give specific responses to the mainly open-ended questions posed by the researcher.

The key informants were from a variety of institutions and agencies and private endeavours, with all informants actively involved in biodiversity stewardship. They were grouped into two broad categories (Table 4-1):

- Biodiversity conservation experts (including private specialists working in the field of biodiversity stewardship conservation, statutory bodies, NGOs and spheres of government);
- Stewardship landowners and/or managers (usually commercial farmers, but sometimes community owned), farm managers, previous farm managers and biodiversity stewardship site representatives).

These stakeholders were from various hierarchical levels so that information and knowledge pertinent to the biodiversity stewardship programme were accessed. For the purpose of this study, the various stakeholders were not referred to by name; this was to maintain anonymity amongst the stakeholders, as many sensitive issues were dealt with and many informants indicated they would like to remain anonymous on the informed consent form (**Appendix A**).

Table 4-1: Key informants interviewed for the purposes of the research

	<i>Number of stakeholders from organisation interviewed</i>	<i>Date of interview with stakeholders</i>
Biodiversity conservation experts		
EKZNW	2	15/03/2011 and 24/03/2011
Mpumalanga Tourism and Parks Agency	1	1/06/2011
CapeNature	2	1/06/2011
Wildlands Trust	1	3/06/2011
DEA	1	2/06/2011
SANBI	1	28/05/2011
EWT	1	12/05/2011
WWF	1	2/06/2011
Stewardship landowners and/or managers		
Roselands Nature Reserve farm owner	1	31/03/2011
Bill Barnes Crane and Oribi Nature Reserve representative	1	31/03/2011
Umngano representative	1	15/04/2011
Previous manager of Umgeni Valley	1	08/06/2011
Dalton Private Nature Reserve manager	1	10/06/2011

A total number of fifteen interviews were conducted. Initial contact was made with the informants telephonically and interview appointments were then set up. During the interviews, information was transcribed and recurring themes were highlighted. Care was taken in ensuring the data gathering process was as objective as possible. Interview schedules were drafted for the research (**Appendix B** and **C**). Although there was a schedule and set of relevant questions and topics, the schedule did not constrain the interviewer in answering the various questions. The interviewee was probed and additional enquiries were made to pertinent issues. The interview schedules followed the same format for each interview; however, there were some variations in questions. These variations were allowed for as although all informants had a strong conservation background and were involved in biodiversity stewardship, many of the informants had specialised knowledge.

The attendance of a biodiversity stewardship-training workshop in June 2011, held at the Wetland Reserve and Training Centre in Wakkerstroom, Mpumalanga was a great opportunity for the researcher. The purpose of the workshop was to exchange and share knowledge and experiences of biodiversity stewardship to engage in the way forward.

The biodiversity stewardship-training workshop was organised by the Endangered Wildlife Trust (EWT). A number of key informants attended the workshop: DEA officials, NGO representatives, and key provincial biodiversity personal from CapeNature, MPTA, EKZNW, Gauteng, Eastern Cape and the Free State; a number of informal semi-structured interviews were undertaken with the key provincial biodiversity personal. The presentations and subsequent discussions served as a source of data for this research.

The semi-structured interviews incorporated a number of key themes (including biodiversity conservation, limitations, process involved, and perceptions of biodiversity stewardship, management and follow-up). Biodiversity conservation officials were selected for their reputations within the field, extensive knowledge, expertise, experience and involvement with regard to SCP, biodiversity conservation and biodiversity stewardship conservation of South Africa and more specifically KZN.

These informants were interviewed to gain an understanding of their views on biodiversity conservation; cooperative governance and their position and opinion on major limitations that they had come across relating to biodiversity stewardship. Biodiversity stewardship as a conservation programme was outlined and limitations and opportunities were considered. Interviews with relevant personnel gave a strategic approach and aided in developing ways in which to assess the implementation prospects of biodiversity stewardship. The informants have knowledge in biodiversity conservation, which enabled a practical understanding as they have hands on experience in the biodiversity conservation field.

Interviews with stakeholders involved in biodiversity stewardship conservation gave an understanding of the perceptions of people involved in the process, i.e. the farmers and stewardship representatives. This gave an indication of the success and failure of the biodiversity stewardship programme to date and provided insights into the implementation prospects for the biodiversity stewardship programme in the future.

4.5 Data Analysis

To address the research question the data collected has to be analysed. The examining, classifying, tabulating and combing of information are all aspects of data analysis (Rossouw, 2012). For the purposes of this research documentary analysis, case study analysis and thematic analysis are the techniques used.

4.5.1 Documentary analysis

Secondary data is any published data (Martin and Pavlovskaya, 2010). According to Martin and Pavlovskaya (2010), secondary data is the data that comes from a wide range of different sources that the researcher would be unable to collect him/herself. Secondary data informs vast academic work. The pure scale of the data examined is extensive; this is an advantage of using secondary data. Most secondary data is collected by professionals in that specific field and the accessibility of secondary data is good, as it is available in a digital format.

Conversely, there are limitations to secondary data. The information should not be treated as fact (Hoggart, Lees and Davies, 2002). Secondary data can narrow the research opportunities and the quality of results and finding could be eroded (Martin and Pavlovskaya, 2010). Secondary data is often a partial representation of reality and many sample data maybe interpolated and furthermore, the sample may contain some bias (Martin and Pavlovskaya, 2010).

According to Martin and Pavlovskaya (2010), the researcher should identify the research needs and redesign the data accordingly. “Using secondary data gives a researcher important advantages in terms of data coverage, quality, and costs, as well as opportunity to analyse phenomena that otherwise would be impossible to analyse” (Martin and Pavlovskaya, 2010:190).

The secondary data that is yielded by the documentary analysis enables the researcher to establish primary data. How the information portrayed is controlled as the researcher can choose what to included or emit (Hoggart, Lees and Davies, 2002). Krippendorff (2004) describes documentary analysis as one of the most important techniques to research: it views data as representations created to be interpreted and argued. Documents such as journal articles, books, written documents, governmental papers and internet sites convey a vast amount of information to the observer (Krippendorff, 2004). According to Kohlbacher (2006), documentary research is important as it supplies background material for the real life situation: often documents will claim something and this can be supported or disputed by the real life situation. The documentary analysis aids in representing evidence that the researcher does not produce but is already in existence (Kohlbacher, 2006). Through a documentary analysis, issues which might not usually be accessible through direct contact are gained, long time periods can be examined and trends throughout time can be assessed (Hoggart et al., 2002).

For this research a review of the relevant literature from academia (including books, unpublished theses and journals) for a body of theory on biodiversity conservation, SCP, and PAs. An analysis of the relevant BSP documentation, government reports and publications was also undertaken (presented in Chapter Five). Reviewing relevant literature and undertaking a documentary analysis provided a conceptual framework that guided the research.

The documentary analysis was undertaken to answer objective one: to conduct a desktop investigation of the approach, methods and gaps of SCP in South Africa. To answer this objective, the desktop study involved extensive research on conservation planning in the international context as well as at the national and local level. Additional literature, which was consulted, focussed on grassland conservation and South Africa’s current practice, more specifically the systematic conservation approach to grassland conservation in South Africa. Books, journals and dissertations all formed part of the research. Further reading and research were conducted using sources such as governmental documents, internet sites and media accounts. Although these sources were not academically reviewed, there is great importance in such sources of information as they render relevant and recent information (Hoggart et al., 2002). From the literature examined, various topics

were explored and applicable issues in case studies were identified and argued. To answer the research objectives, GIS operations are undertaken to ascertain current site selection and identify potential future site suitability, and to understand the implications of these outputs in grassland biome conservation.

4.5.2 GIS operations

According to Hanna (2010:259), maps are a powerful tool in “visualising, exploring, storing and communicating geographic information”. Geographic Information Systems (GIS) allow for the measuring and analysing of large volumes of data depicting patterns and trends between the mapped features (Wakelin and Hill, 2007; Goodchild, 2010).

Spatial datasets and conservation plans

ArcMap version 10 was made available by the Cartography Department of the University of KwaZulu-Natal. ArcMap version 10 was used in the preparation, editing of the data, presentation and data management. A database query, reclassification, buffering, and measurements of area constitute the GIS operations of this research. The spatial datasets and conservation plans which were used (Table 4-2) were manipulated and edited to portray spatial information to answer specific objectives.

Table 4-2: Spatial datasets and conservation plans used in the GIS operations

Datasets and conservation plans	Description	Use in Study	Source
Biodiversity stewardship site polygons	Boundaries of the biodiversity stewardship sites	Definition of boundaries of the case study sites	EKZNW (2011a)
KZN TSCP	C-Plan software used based on irreplaceability and Minset	Examining the case study sites for: <ul style="list-style-type: none"> • Irreplaceability and BPA identification. • Calculation of BPAs hectares contained within biodiversity case study site 	EKZNW (2010)
KZN Land cover 2005 (2008v1.1)	Satellite-derived classification of land use	Used to identify areas of unsuitable and possible suitable areas for future potential stewardship sites	EKZNW (2011b)

KZN TSCP: Minset and irreplaceability

The TSCP was published after EKZNW completed the biodiversity stewardship assessments and therefore no analysis with the TSCP was undertaken by EKZNW. The TSCP differs from the 2007 C-Plan as most data sets are improved and updated, specifically the land cover data, the TSCP utilised the 2005-v2 Landcover as opposed to the NLC 2000 v 1.2 utilised in the 2007 C-Plan.

KZN Land Cover (transformation layers)

The latest available land cover data for KZN was published in 2011, produced by GeoTerraImage. SPOT imagery that was acquired from the SA government and Council for Scientific and Industrial Research. The imagery used to generate the land cover dataset is from 2008 (EKZNW, 2011).

Pre-processing and general operations

The KZN Land cover 2005 (2008v1.1) dataset and TSCP were used to generate layouts of suitable and unsuitable areas in a GIS environment using database query, reclassification, buffering and area measurement; this was to answer objective three of the research study. Identifying potential future biodiversity stewardship site suitability enables the understanding of the implications of transformed land on the suitability of stewardship sites, particularly for grassland conservation. A more detailed description of the process that was undertaken in answering the objective is provided below. The output layouts are then presented in Chapter Five and discussed.

Projections and Transformations

To run the analysis, the datasets and the TSCP had to be in the same coordinate system (map projection and datum). A projected coordinate reference system, called Universal Transverse Mercator (UTM34s) was selected using the Define Projection tool.

Occurrence and extent of BPAs of TSCP within case study sites

The TSCP 2010 was projected to UTM34S. Each biodiversity stewardship case study site was overlaid with the TSCP to examine the BPAs contained within and relative to the case study sites. This process was undertaken for all three biodiversity case study sites to identify the BPAs occurrence within each biodiversity stewardship case study site, this ascertained the current site selection aiding in understanding the implications of the outputs in meeting grassland conservation objectives.

Using the 2007 C-Plan, the EKZNW BSP documentation determined the irreplaceability values and whether the case study site was a mandatory or negotiated reserve in terms of the Minset map. The biodiversity stewardship case study sites were selected on the basis that they contribute to provincial and national PA, species and vegetation targets. Using the updated TSCP and identifying the BPA occurrence within the case study sites allows for verification of the case study site selection and if any changes are apparent in terms of the mapped spatial biodiversity conservation significance. For example if a site was not identified as a biodiversity priority in terms of the 2007 C-Plan but is identified as a priority area in terms of the TSCP this indicates that the site holds more conservation significance based on the updated conservation plan. Using an updated conservation plan (TSCP 2010) and identifying the occurrence of the BPAs contained within the site is done to verify the selection of the current sites. In practical terms, if a BPA 1 is identified within the case study site this indicates that the site has no alternative site to meet the predefined targets. If there is BPA 2

within the case study sites, it indicates there are alternate sites that would meet the targets, but there are not many. The occurrence of BPA 3 contained within the case study sites would indicate that there are alternative sites to meet the predefined targets but it does not indicate lower biodiversity importance.

The calculation of the extent of BPA contained within the case study sites is done to understand the implications of these outputs for grassland conservation. A higher extent of BPAs found within the case study sites indicates greater conservation significance. To identify BPA extent contained within the case study sites, the TSCP layer was clipped with the biodiversity case study site polygon. The Select by Attributes dialogue box was then opened and a new selection was created using the query 'PAMINSET = BPA 1'. The attribute table was opened and the area field was selected and right clicked to open the statistics whereby the sum of the area was displayed. This process was repeated for each of the three BPAs for each biodiversity stewardship case study site.

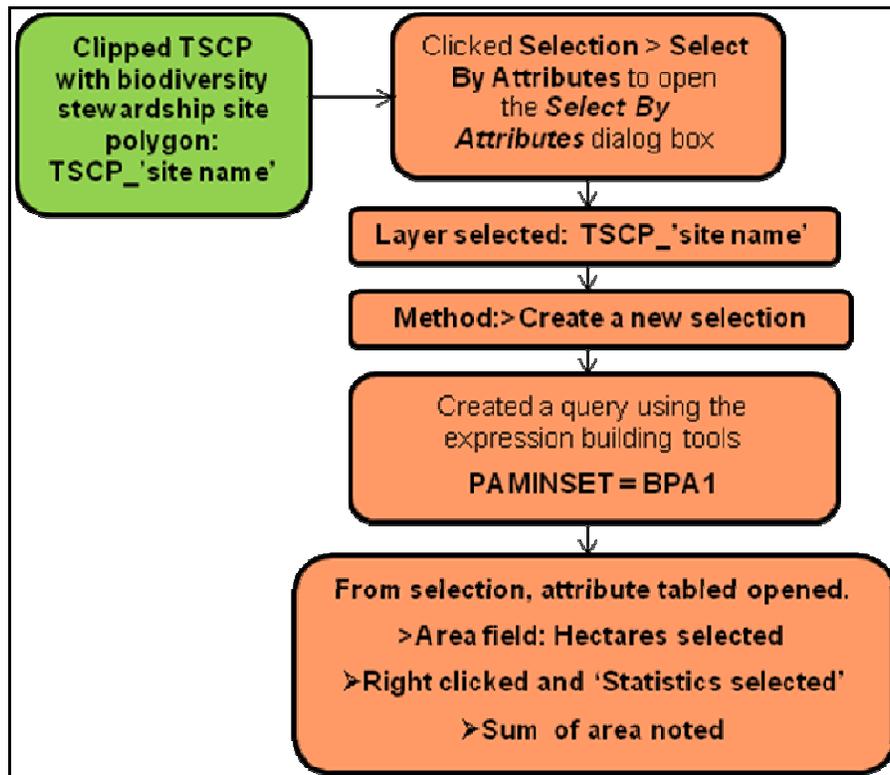


Figure 4-1: Calculation of area for BPAs within case study sites

Identifying potential priority areas for future biodiversity stewardship

The KZN land cover 2005 (2008v1.1) dataset was used to establish the specific land uses associated within and surrounding the biodiversity stewardship case study sites. Threats such as agricultural cropland, alien invasive species, plantations and urban settlements are identified. This gave some indication of the setting of the site and the possible threats associated with certain land uses.

Identifying priority areas for conservation is a vital component of stage one of SCP, potential future biodiversity stewardship site suitability is identified in a GIS environment. This is done to identify 'suitable areas' for the possible expansion of existing stewardship sites and identification of potential new future sites, with particular focus on the grassland biome. This enables an assessment of the potential for the KZN biodiversity stewardship programme towards achieving grassland biome conservation in the province. Identifying sites for future potential biodiversity stewardship sites will aid in decision-making and future land use planning.

The potential priority areas for future biodiversity stewardship surrounding the case study sites is done by utilising the Biodiversity Priority Areas (BPA), land use (reclassified) and the TSCP. In a GIS environment, the KZN land cover categories were reclassified into (Table 4-3, column 2):

- transformed land uses and
- natural or degraded land uses were grouped into similar land use categories

Land uses that are degraded or natural are considered to have value for future conservation. Each biodiversity stewardship case study was then overlaid with the output-reclassified layer.

Table 4-3: Reclassification of the KwaZulu-Natal land cover based on transformation

Land use	Reclassified	Further Reclassified
Degraded bush land (all types)	Degraded bush land (all types); Degraded forest; Degraded grassland	Possibly Suitable
Degraded grassland	Degraded bush land (all types); Degraded forest; Degraded grassland	Possibly Suitable
Old cultivated fields - grassland	Old cultivated fields – grassland	Possibly Suitable
Smallholdings - grassland	Smallholdings – grassland	Possibly Suitable
Natural Fresh Water	Estuarine Water; Natural Fresh Water; Wetlands; Wetlands-mangrove	Possibly Suitable
Wetlands	Estuarine Water; Natural Fresh Water; Wetlands; Wetlands-mangrove	Possibly Suitable
Wetlands-mangrove	Estuarine Water; Natural Fresh Water; Wetlands; Wetlands-mangrove	Possibly Suitable
Forest	Bush land (< 70cc); Dense bush (70-100 cc); Forest	Possibly Suitable
Dense bush (70-100 cc)	Bush land (< 70cc); Dense bush (70-100 cc); Forest	Possibly Suitable
Bush land (< 70cc)	Bush land (< 70cc); Dense bush (70-100 cc); Forest	Possibly Suitable
Grassland / bush clumps mix	Grassland / bush clumps mix	Possibly Suitable
Grassland	Grassland	Possibly

		Suitable
Alpine grass-heath	Alpine grass-heath	Possibly Suitable
Estuarine Water	Estuarine Water; Natural Fresh Water; Wetlands; Wetlands-mangrove	Possibly Suitable
Outside KZN	Unsuitable	Unsuitable
Plantation	Unsuitable	Unsuitable
Plantation clear felled	Unsuitable	Unsuitable
Permanent orchards (banana, citrus) irrigated	Unsuitable	Unsuitable
Permanent orchards (cashew) dry land	Unsuitable	Unsuitable
Permanent pineapples dry land	Unsuitable	Unsuitable
Sugarcane - commercial	Unsuitable	Unsuitable
Sugarcane - emerging farmer	Unsuitable	Unsuitable
Mines and quarries	Unsuitable	Unsuitable
Urban	Unsuitable	Unsuitable
Golf courses	Unsuitable	Unsuitable
Rural dwellings	Unsuitable	Unsuitable
Annual commercial crops dry land	Unsuitable	Unsuitable
Annual commercial crops irrigated	Unsuitable	Unsuitable
Bare sand	Unsuitable	Unsuitable
Erosion	Unsuitable	Unsuitable
Bare rock	Unsuitable	Unsuitable
KZN national roads	Unsuitable	Unsuitable
KZN main and district roads	Unsuitable	Unsuitable
Dams	Unsuitable	Unsuitable
Coastal Sand and Rock	Unsuitable	Unsuitable

The land use classes were reclassified and all land uses deemed to be irreversibly transformed were deemed unsuitable for biodiversity stewardship, land that was natural or degraded was reclassified to be possibly suitable for future potential biodiversity stewardship areas. This output layer was then combined with the TSCP and a layout created.

The GIS operations were used to understand the spatial considerations of the case study sites, to further understand the implementation prospects of biodiversity stewardship and develop insights of how implementation can be improved a series of semi structured interviews were undertaken. Through a thematic analysis the key themes were identified.

4.5.3 Thematic Analysis

Research conducted involving semi-structured interviews yielded primary data. The main analysis of the semi-structured interview data was done by thematic analysis. “Thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data” (Braun and Clarke, 2006:79). Thematic analysis describes inherent and precise ideas within the data; these are the themes (Kitchin and Tate, 2000). The themes are often described as emerging from the data, however the researcher has an active role in identifying the themes and patterns and documenting them (Braun and Clarke, 2006). Thematic analysis can be used on the reporting of experiences and realities of stakeholders (Braun and Clark, 2006). Themes are identified as being important aspects of the data which relate to the research questions (Braun and Clarke, 2006).

The primary data from interviews has to be coded into suitable data for analysis (Braun and Clarke, 2006). Coding involves actively reading and re-reading the data to identify any themes related to specific research questions. The reduction of information to codes representing themes and finding relations among the codes is an important part of thematic analysis (Spence and Owens, 2011).

The thematic analysis of primary data collected during the semi structured interviews constituted the main data analysis method used in the study. The familiarisation with the data recorded during the semi-structured interviews facilitated the coding process. Coding involved highlighting and drawing attention to reoccurring features of the data set. The coding process enabled the presentation of the key themes by broader narrative descriptions. Selected quotations highlighted the stakeholder perceptions dynamics as played out in the case of biodiversity stewardship.

The information gathered during the semi-structured interviews enabled the understanding of the implementation prospects of the biodiversity stewardship programme from the perspective of all the stakeholders involved in stewardship and developed insights into how implementation can be improved.

4.6 Limitations and strengths

In any research, there will be a number of strengths and limitations. In the research conducted, developing a clear and concise conceptual framework proved complex. From the consultation of a wide range of literature, the conceptual framework was well informed. The topic of conservation is extremely broad and there are a number of different themes and ideologies, and to refine the research and incorporate only relevant literature was challenging. This challenge was overcome by constantly consulting and reviewing the aim and objectives. Conversely, the peer-reviewed literature on biodiversity stewardship was limited. Although the peer review literature was limited, South African legislation provides a platform for biodiversity stewardship and it is guided and governed by NEM: BA and NEM: PA. International literature on similar initiatives was restricted however.

The data released during the course of undertaking this research (the 2010 TSCP and the 2011 Landcover) formed key data sets informing the research. Limitations in terms of the data sets include the limitations of Minset, as it is a provincial-scale modelled dataset, where it is vital to verify whether the findings are true on the ground. This limitation applies to many data sets, as ground truthing is an important component of GIS.

Time constraints were a major obstacle that had to be overcome and often it was found that reliance on a key informant to set up interviews, proved difficult. However, key informants were extremely helpful and provided information freely, which adequately aided the research in documenting key themes and their contributions to the research were significant. Limitations identified during the semi-structured interviews included the wish of some interviewees to remain anonymous. This proved challenging as the researcher did not want to lose the relevance and validity of the data, and thus all stakeholders interviewed were given anonymity.

With all three biodiversity stewardship sites still in the incipient phases, the evaluation of effectiveness is based on the probability of the management objectives being achieved. Thus, a limiting factor of the research was identified in the assessing of the true operational and sustainability of these biodiversity stewardship sites. To resolve this, the assessment would have to be undertaken on an ongoing and continual basis.

The opportunity to attend a training workshop on biodiversity stewardship in Wakkerstroom allowed the researcher to develop key relationships with specialists in the biodiversity stewardship field. This allowed the researcher to obtain relevant information from a wide variety of key informants in a short space of time. The key informants provided information freely to the researcher allowing the process, strengths and limitations of biodiversity stewardship to be understood and documented. A limitation of the semi-structured interviews conducted was the requirement of some informants to remain anonymous, especially with regard to sensitive information. This limitation was overcome by keeping the identity of all informants anonymous. This was so that issues that informants discussed off the record were not lost.

A key strength in the research process was that the biodiversity stewardship assessment documentation was readily available from EKZNW. The information portrayed in these assessments was updated and verified by means of separate GIS operations conducted by the researcher. All the GIS data was readily available from the University of KwaZulu-Natal Cartography Department and EKZNW.

4.7 Conclusion

This chapter begins with a description of the research and proceeds to describe the characteristics of the research methodology. An examination of the research design for the current research project is also outlined. The BSP documentation yielded secondary data forming part of the documentary analysis and enabled the researcher to identify and outline the role biodiversity stewardship in KZN plays in meeting grassland conservation objectives.

Techniques selected to answer the research question include GIS operations that were undertaken in ArcMap 10. This allowed the researcher to reinforce the findings of EKZNW BSP documentation and to identify potential future biodiversity stewardship site suitability. To answer one of the main research objectives, a series of semi-structured interviews exploring the stakeholder perspectives on and attitudes to the challenges and opportunities for the successful implementation of biodiversity stewardship in KZN and in South Africa were conducted; this yielded primary data. The results and discussion of the research process are presented in Chapters Five and Six below.

Chapter 5. Spatial Considerations for the Biodiversity Stewardship Programme

5.1 Introduction

This chapter presents the results and discussion for the research objectives relating to the GIS operations. The case study sites were rigorously assessed by EKZMW when they entered into the biodiversity stewardship programme. These assessments were undertaken by EKZMW to determine the biodiversity value of the biodiversity stewardship site and its potential contribution to conservation target achievement, the land-use pressures and threats of the stewardship site and to establish the preferred stewardship category and develop management objectives.

Using the 2007 C-Plan, the EKZMW BSP documentation determined the irreplaceability values and in terms of the Minset map whether the case study site was a mandatory or negotiated reserve. The biodiversity stewardship case study sites were selected on the basis that they contribute to provincial and national PA, species and vegetation targets. The TSCP is an updated version of the C-Plan, the TSCP uses improved and updated datasets better reflecting topography and aspect and accounting for fragmentation and condition (Escott, 2011). As the TSCP better reflects biodiversity, one of the focal points of the GIS operations is to crosscheck the sites against the updated TSCP to verify current biodiversity stewardship site suitability. Identifying the TSCP BPA occurrence within the case study sites allows for verification of the case study site selection and if any noteworthy changes are apparent in terms of the mapped spatial biodiversity conservation significance. Examining the case study sites and gleaning out the information that pertains specifically to grasslands enables a better understanding of the role the case study sites play in meeting grassland conservation objectives.

The spatial plans that EKZMW use to identify important conservation areas are merely a guide to inform decision-making, and aligning with these plans should not be a sole priority for conservation planners (Cadman et al., 2010). The alignment of the biodiversity stewardship case study sites with spatial plans is only one aspect of this research. The success of systematic conservation planning and its usefulness for implementation of conservation plans is largely dependent on stakeholder engagement (Knight et al., 2006). Hence the importance of the Chapter Six of this research to examine insights into the benefits of and barriers to the effective implementation of biodiversity stewardship in KZN and South Africa, which are gathered from interviews and discussions with key stakeholders. Stakeholder engagement is arguably the one of most important aspects of conservation.

In answering objective three, the potential for the expansion of existing stewardship sites and/or identification of potential new future sites with particular focus on the grassland biome is undertaken in a GIS environment. The potentially 'unsuitable' and 'suitable' areas are generated using the TSCP and the latest land cover data (KZN Land cover 2005 (2008v1.1)). This enables a current assessment of the potential for the KZN biodiversity stewardship programme towards achieving grassland biome conservation in the

province. Identifying sites for future potential biodiversity stewardship sites will aid in decision-making and future land use planning and stewardship.

5.2 Understanding and verifying case study site selection

The BSP assessments undertaken by EKZ²NW examined the case study sites relative to spatial plans such as the KZN PAES, the C-Plan 2007 and local SDFs. The potential differences in the alignment of the biodiversity stewardship case study site with the KZN C-Plan (2007) and the updated TSCP (2010) are reviewed and highlighted below. This is done to verify current biodiversity stewardship case study site suitability, and understand the implications of these outputs for grassland conservation. To substantiate the findings of the BSP documentation in terms of the case study sites conservation significance, the occurrence and extent of the TSCP BPAs within the case study sites is explored.

The series of maps created (Figure 5-1) and the attribute table information (Table 5-1 and Table 5-2) are used to examine the following:

- Occurrence of TSCP Biodiversity Priority Areas within the case study sites which allows for verification of the case study site selection and if any changes are apparent in terms of the mapped spatial biodiversity conservation significance;
- Extent of TSCP Biodiversity Priority Areas contained within the case study sites; which aids in understanding the implications of these outputs in meeting conservation objectives specifically for the grassland biome;
- Identifying suitable areas for future potential biodiversity stewardship based on TSCP BPAs, land use and transformation. Potential areas based on their biodiversity priority and conflict avoidance is important as it assists decision making and future planning specifically for grassland conservation.

The overview of the EKZ²NW biodiversity stewardship programme was provided in Chapter Three. Further to this, for each case study site, namely Roselands, Bill Barnes Crane and Oriibi Nature Reserve and Umgano, a series of layout maps are presented and discussed.

BPAs (based on TSCP) occurrence and extent within the case study sites

This research replicates the methods of EKZ²NW using the updated TSCP 2010 to document the occurrence and extent of BPAs within the case study sites. The BPAs (based on irreplaceability and Minset) indicate areas with conservation significance. The layout maps A, B and C (Figure 5-1) show the BPAs contained within the sites. Occurrence of BPAs indicates the meeting of the predefined targets of the TSCP. Targets adopted in the TSCP are ‘a combination of field expertise, scientific study and raw data’ (Escott, 2011:31). The TSCP uses broad environmental surrogates to represent the planning region’s biodiversity to ensure the long-term maintenance, aiding in representation and persistence (Smith and Leader-Williams, 2006). The

occurrence of the BPAs builds on the relevance of the initial case study stewardship site selection undertaken by EKZNW.

The occurrence of BPA 1 (Irreplaceability score=1) is evident in all three case study sites. Umgano also incorporates BPA 3 (Irreplaceability Score ≥ 0 and < 0.8) (Table 5-1).

Table 5-1: Biodiversity Priority Areas contained within the case study sites

Case study site	Roselands	BBCONR	Umgano
BPA 1*	✓	✓	✓
BPA 2**			
BPA 3***			✓

BPA 1* (Irreplaceability = 1) BPA 2** (Irreplaceability Score ≥ 0.8 and < 1.0) BPA 3*** (Irreplaceability Score ≥ 0 and < 0.8)

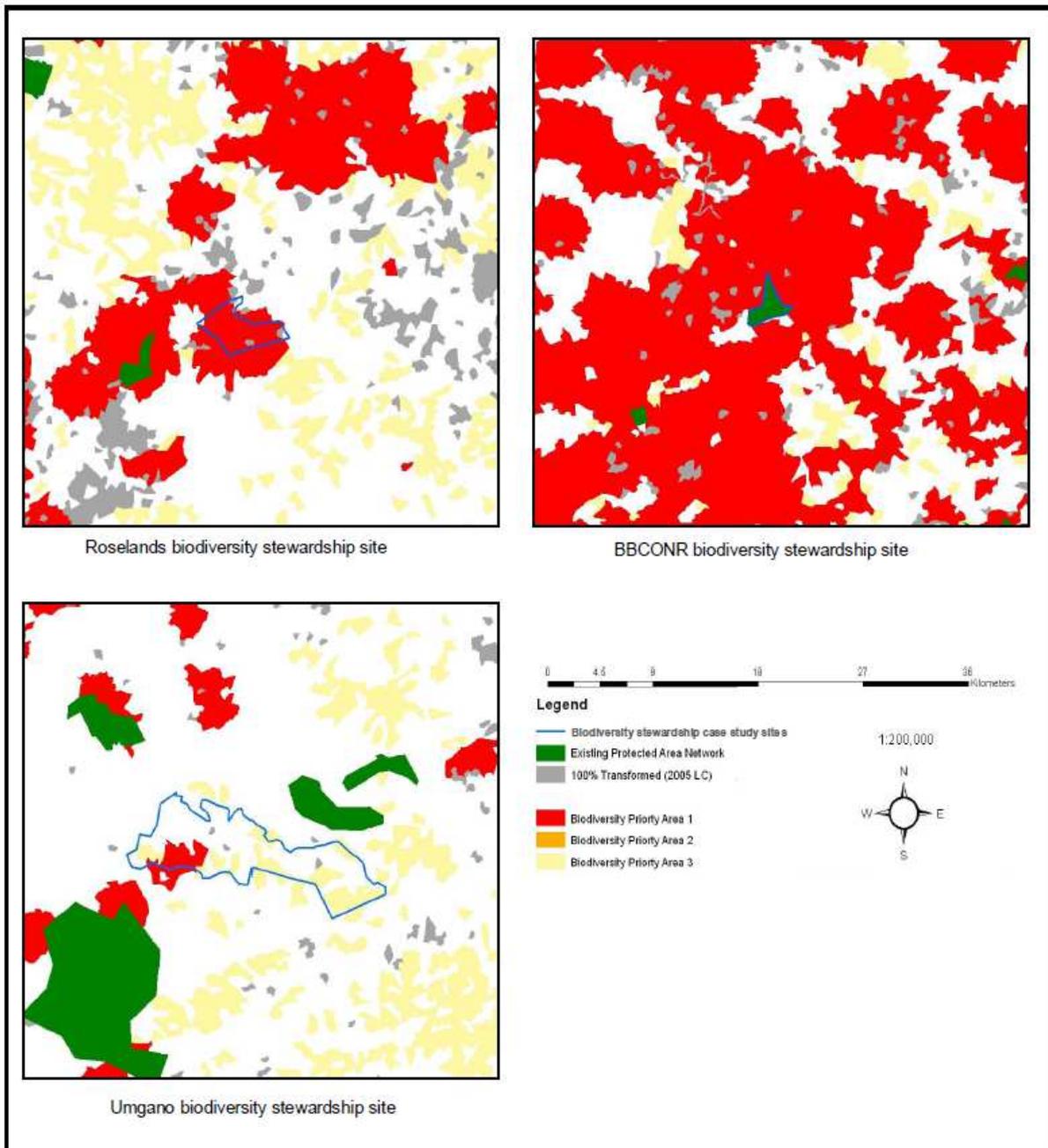


Figure 5-1: Occurrence of BPAs within case study sites (adapted from EZKNW, 2010b)

Extent of BPAs contained within the case study sites

Based on the TSCP, 947 hectares (82%) of Roselands constitutes BPA 1 (Table 5-2). There are 205 hectares of Roselands that are not identified as a BPA; this is an irreversibly transformed area with no known biodiversity value.

According to the TSCP (Figure 5-1), the BBCONR has been included in the PA network. For BBCONR 440.4 hectares (98%) constitute BPA 1 (Table 5-2). The remaining 9.3 hectares (2%) is made up of areas of irreversible transformation.

According to the TSCP, 593 hectares (11%) of Umgano is identified a BPA 1 and 1011 hectares (19%) of Umgano is identified as a BPA 3 (Figure 5-1; Table 5-2). A further 3,746 hectares (70%) of Umgano are not identified by the TSCP as having any conservation significance; only a small degree of transformation is identified.

Table 5-2: Extent of Biodiversity Priority Areas included in the case study sites

Case study sites	Roselands		BBCONR		Umgano	
	Area (ha)	Percentage of total area (%)	Area (ha)	Percentage of total area (%)	Area (ha)	Percentage of total area (%)
BPA 1*	947	82	440.4	98	593	11
BPA 2**	0	0	0	0	0	0
BPA 3***	0	0	0	0	1,011	19
Not included as priority	205	18	9.3	2	3,746	70
Total	1152	100	449.7	100	5,350	100

*BPA 1 (Irreplaceability = 1)** BPA 2 (Irreplaceability Score >= 0.8 and <1.0) BPA 3*** (Irreplaceability Score >= 0 and < 0.8)

Occurrence and extent of BPAs (based on TSCP) contained within the case study sites

Sites of high irreplaceability aid in achieving conservation targets (Pressey et al., 2009). There are 947 hectares (82%) of Roselands constituting BPA 1. BBCONR almost entirely is a BPA 1, 440.4 hectares (98%) and 593 hectares (11%) of Umgano is identified a BPA 1. As all three case study sites have BPA 1 with high irreplaceability, they aid in achieving conservation targets. Umgano was not identified in the BSP documentation as having a high irreplaceability in terms of the 2007 C-Plan. It was argued by EKZNW biodiversity stewardship assessors that due to poor quality data for the area, this yielded untrue irreplaceability values (EKZNW, 2007c). Umgano falls within an area not well researched and sampled

(EKZNW, 2007c). Lack of incorporating a biodiversity priority area should not be interpreted as reflecting areas of no biodiversity value (EKZNW, 2010). Specifically true for Umgano as, the spatial operations using the TSCP found that 593 hectares (11%) of Umgano is identified a BPA 1 and did have high irreplaceability and were of conservation significance, contradicting the findings of the 2007 C-Plan.

Commonly, sites of high irreplaceability are driven by an umbrella species such as an IUCN red list status species. As identified by the BSP documentation, all case study sites encompass critically endangered species. Generally, the conservation approach to conserving grasslands is to focus on threatened and endangered species and distinctively endemic avifauna (Wakelin and Hill, 2007; Mucina et al., 2006). As identified by the BSP documentation, the Blue Swallow (*Hirundo atrocaerule*) found at Roselands, the various crane species at BBCONR and the White-winged flufftail (*Sarothrura ayresi*) at Umgano are examples of endemic avifauna. Conservation of these species as an umbrella approach aids in securing the habitats these species are found in, namely grasslands.

The occurrence of the surrogate species in the case study sites is significant as policy makers, politicians, the wider public, and non-governmental organisations use it as a draw card for grassland conservation (Dudley et al., 2005; Escott, 2011). Due to their extensive use and poor conservation, grassland ecosystems are a priority for conservation efforts (The Republic of South Africa, 2010; Egoh et al., 2011; O'Connor and Kuyler, 2009). The grassland biome in KZN requires a further 386,343 hectares to be declared under formal protection (McCann, 2011). As presented in Chapter Three, the BSP documentation determines the case study sites' contribution to the national PA targets of the grassland biome. Roselands Nature Reserve secures Midlands Mistbelt Grassland and the Southern KZN Moist Grassland under formal conservation. The BBCONR secures the vulnerable Drakensberg Foothill Moist grassland under formal conservation. The contribution to securing hectares of grassland types under formal conservation is significant and valuable.

5.3 Potential expansion of existing and identification of new future sites

Transformation is the altering of the natural state; transformed land uses have no value for conservation and are 'potentially unsuitable' for biodiversity stewardship. Degraded or natural land uses are considered to have value for future conservation; these areas are reclassified as 'suitable areas' for the expansion of existing stewardship sites and identification of potential new future sites, a particular focus is on the grassland biome.

The TSCP BPAs are based on Irreplaceability and Minset; this indicates that the BPAs are 'minimum areas' that fulfil predefined conservation targets. This addresses the SCP principle of spatial efficiency as the smallest area conserving the highest amount of biodiversity is identified as BPAs. Spatial efficiency also requires conflict avoidance, thus transformed areas can be ruled out.

Based on the land use cover 2005 (April 2008 ver.) the surrounding land use of Roselands is plantations to the north, northeast and southwest (Figure 5-2). According to Map A (Figure 5-5), Roselands is closely (~3km radius) surrounded by land deemed unsuitable for biodiversity stewardship. Further afield there is, however, a distinct northwest to southeast 'corridor' of untransformed grassland and bush land/forest (Figure 5-2).

The land use surrounding BBCONR based on the Land use cover 2005 (April 2008 ver.) is generally agricultural in nature, with annual cropland both irrigated and dry land prominent in the north western, south-eastern and in the north-eastern corner (Figure 5-3). For roughly 25km, fragmented unsuitable land uses surround BBCONR (Map B, Figure 5-5). Annual cropland is the main unsuitable land use surrounding BBCONR (Figure 5-3). To the west, southwest and south of BBCONR there are expansive areas of grassland, predominately the Drakensberg Foothill Moist Grassland (EKZNW, 2007b). To the north east of BBCONR grassland and bush land/forest areas are not too fragmented by unsuitable land uses such as cropland.

Based on the Land use cover 2005 (April 2008 ver.) the Umgano site and surrounding area encapsulates a fair amount of the grassland land use (Figure 5-4). Within Umgano there are fragmented plantations. Small areas of forests are evident on the south western border of Umgano. The unsuitable land uses, which include plantations and subsistence that surround Umgano, are relatively discontinuous and there are vast areas of grassland and bush land uses to the western and north western side of Umgano (Map C, Figure 5-5).

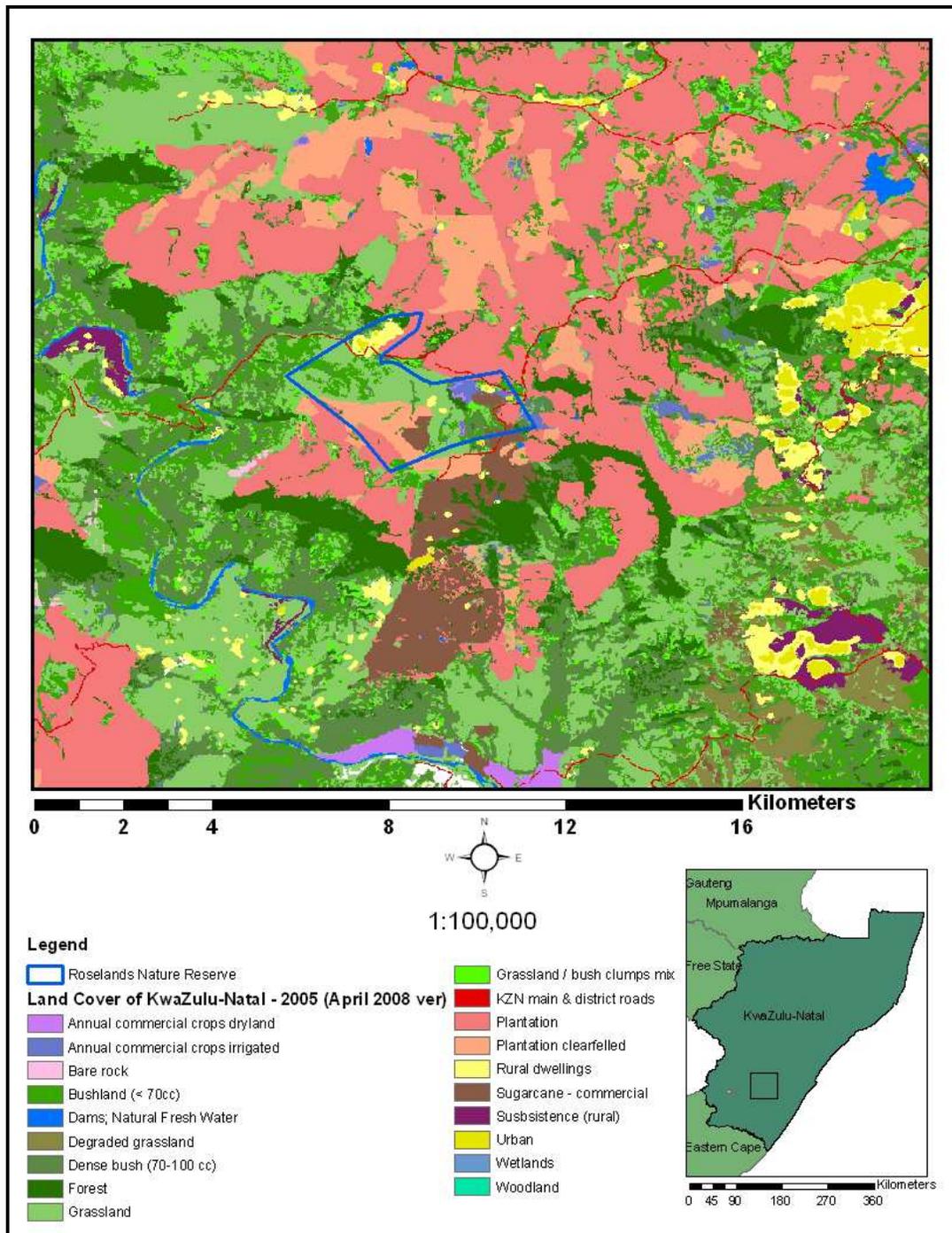


Figure 5-2: Land use cover 2005 (April 2008 ver.) within and surrounding Roselands (EKZNW, 2011)

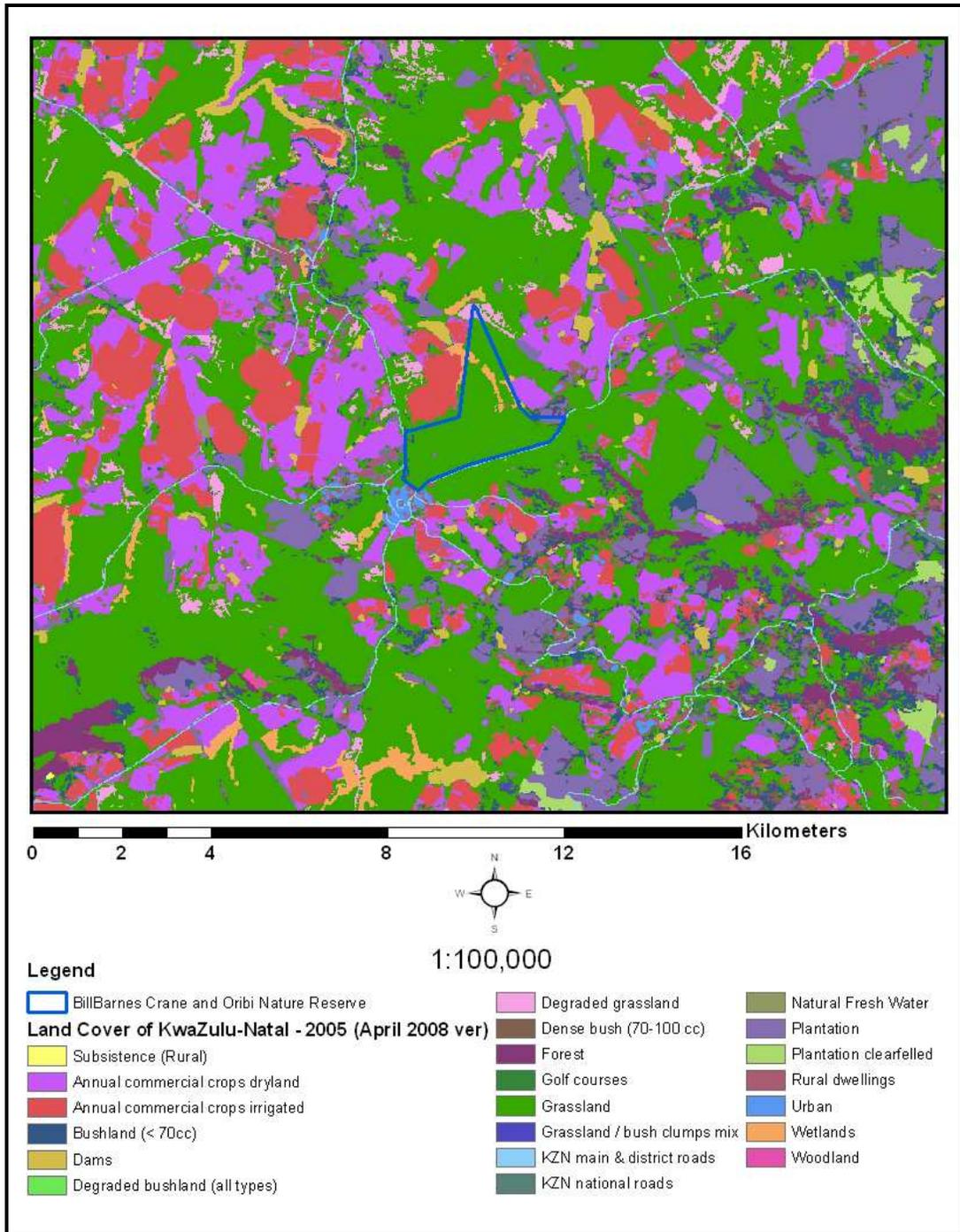


Figure 5-3 Land use cover 2005 (April 2008 ver.) within and surrounding BBCONR (EKZNW, 2011)

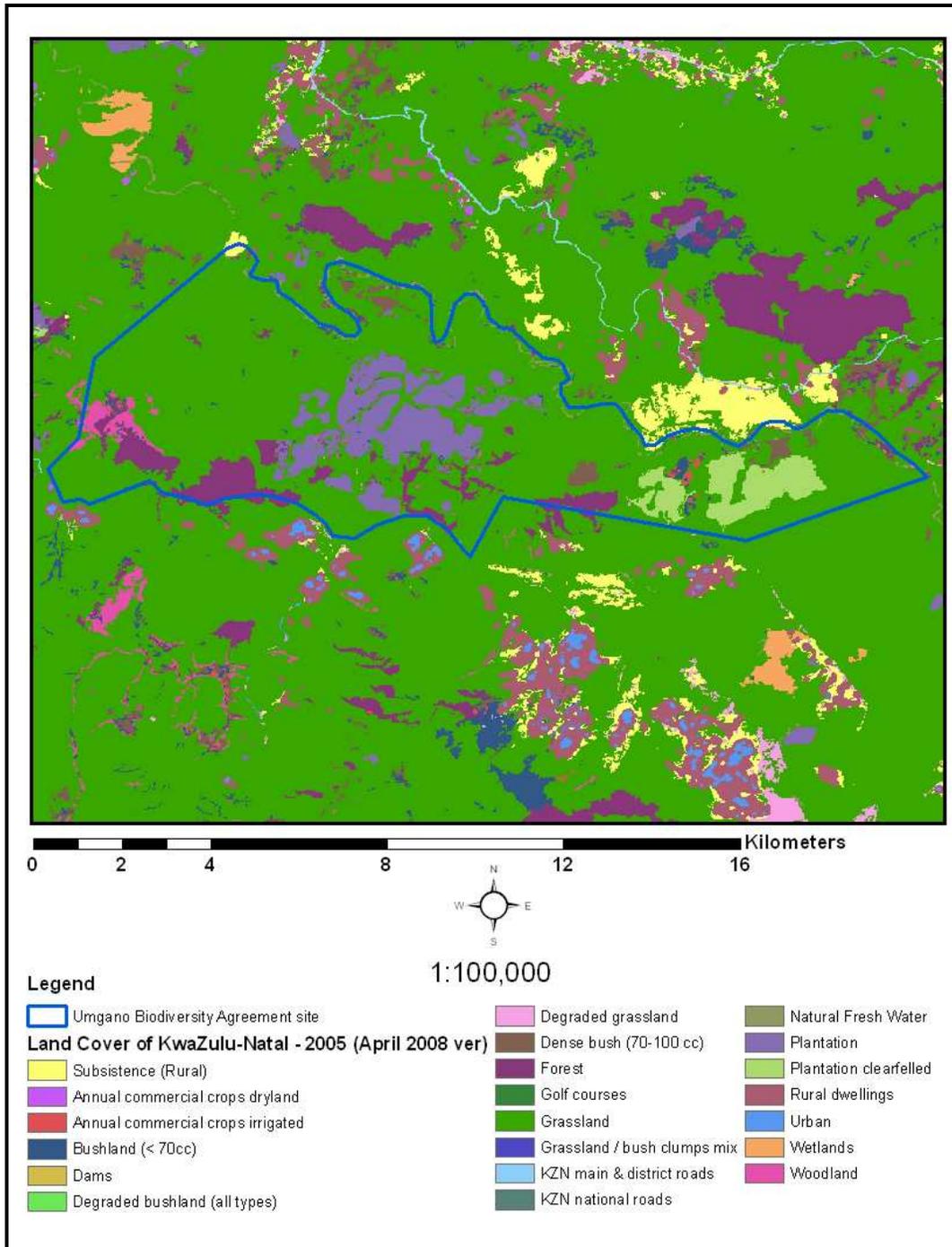


Figure 5-4: Land use cover 2005 (April 2008 ver.) within and surrounding Umgano (EKZNW, 2011)

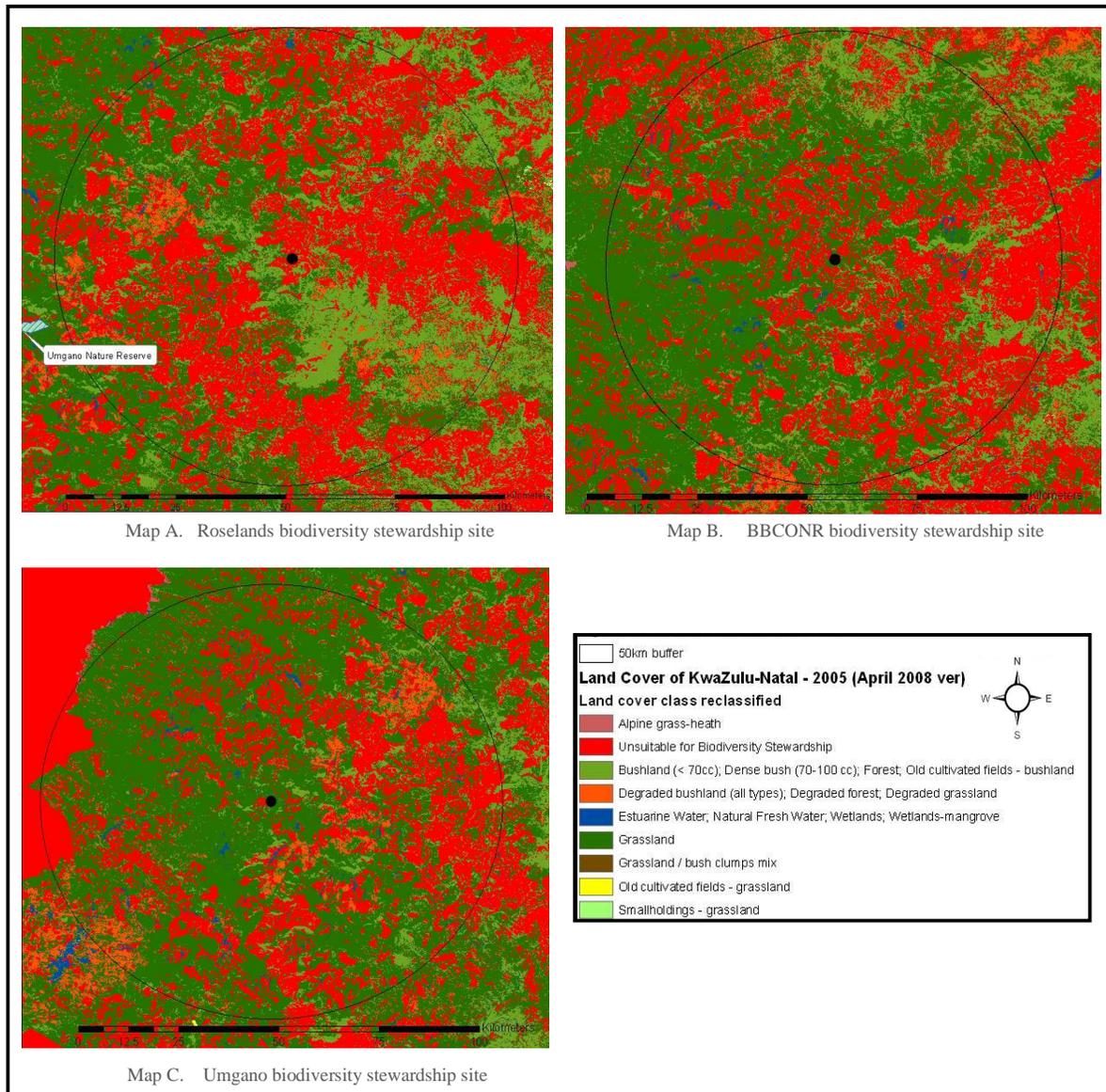


Figure 5-5: Land unsuitability for future potential stewardship sites surrounding case study sites

Areas surrounding the case study sites *possibly suited* for future potential stewardship

Sections marked A, B and C (Figure 5-6, Figure 5-7 and Figure 5-8) in terms of the generated suitable areas are identified as notable ‘priority areas’ surrounding the case study sites; this is based on the BPA of the TSCP and the reclassified land use data. In terms of the GIS operations reclassification, the land uses considered to be irreversibly transformed are deemed *unsuitable* for biodiversity stewardship; land that is natural or degraded is deemed *possibly suitable* for future potential stewardship sites.

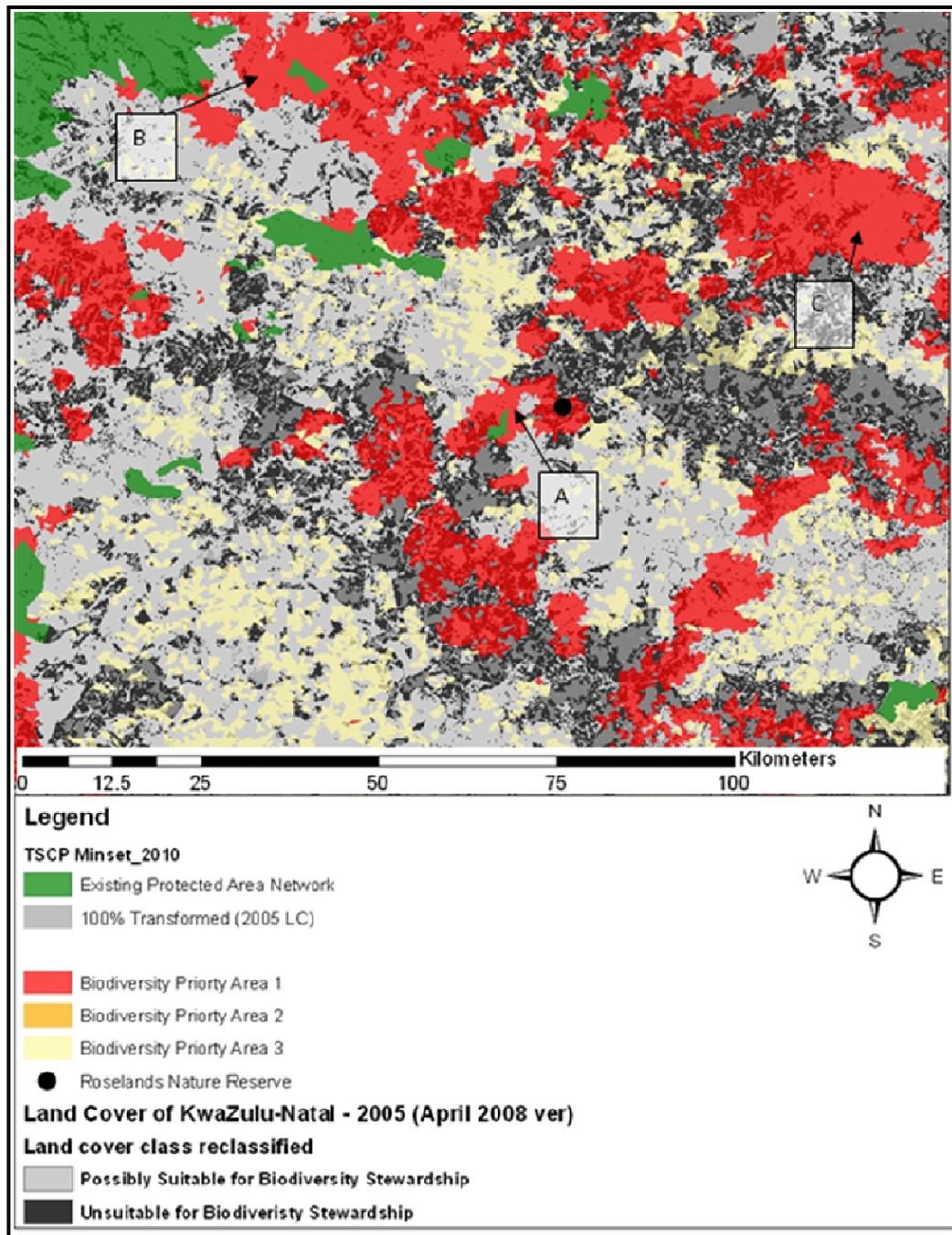


Figure 5-6: Priority areas for future potential stewardship sites in respect to Roselands

‘Possibly suitable areas’ for biodiversity stewardship are fairly fragmented within proximity to Roselands. The regions marked A, B and C (Figure 5-6) are all BPA 1 and do not have extensive areas of transformation surrounding them. Near regions A and B, there are established PAs namely the Soada Forest Nature Reserve and the uKhahlamba Drakensberg Park.

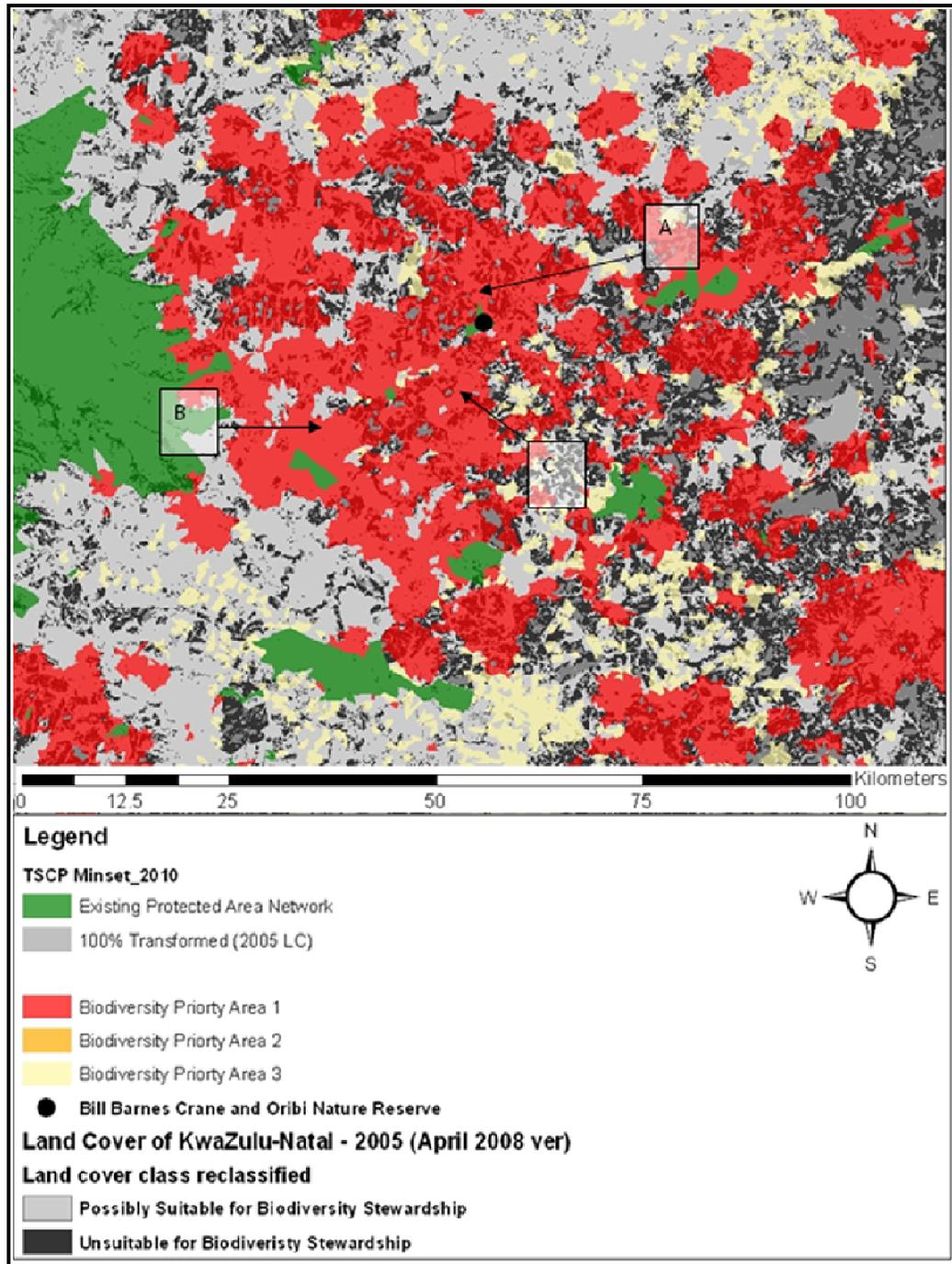


Figure 5-7: Priority areas for future potential stewardship sites in respect to Bill Barnes Crane and Oribi Nature Reserve

BBCONR is surrounded by discontinuous areas of possibly suitable area for biodiversity stewardship (Figure 5-7). The region marked A, north of BBCONR is possibly suitable; however, it is fairly restricted by the unsuitable area of cropland and plantations surrounding it. The regions marked B and C are of great significance for a 'possibly suitable area' for biodiversity stewardship: they are BPA 1 and have 'possibly suitable' land surrounding it.

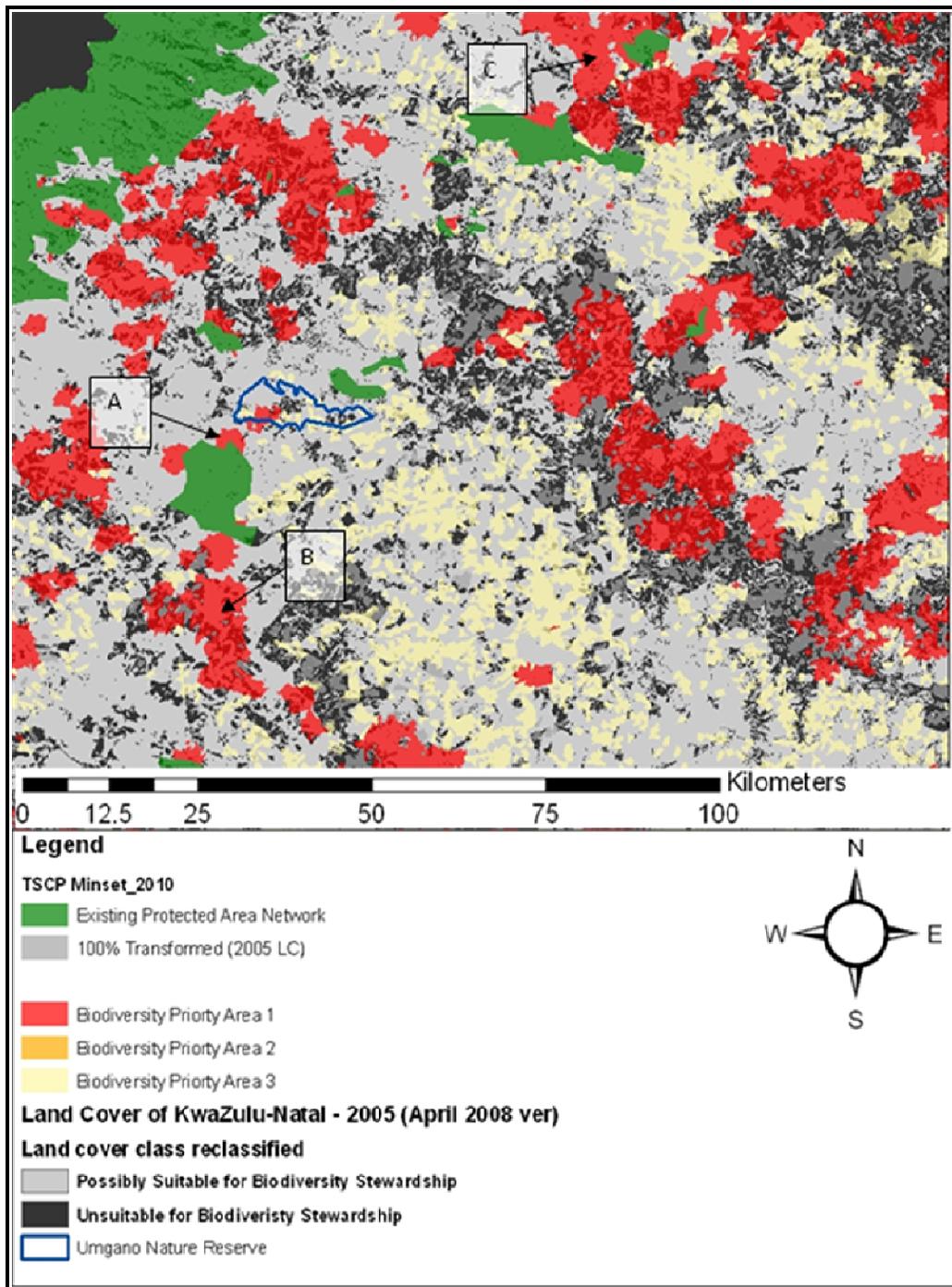


Figure 5-8: Priority areas for future potential stewardship sites surrounding Umgano

Umgano is isolated in relation to ‘possibly suitable areas’ for biodiversity stewardship (Figure 5-8). The regions marked A and B are ‘possibly suitable’; however, they are small and discontinuous. The region marked C is ‘possibly suitable’ area for biodiversity stewardship and is in close proximity to an established PA.

Areas surrounding the case study sites *unsuitable* for future potential stewardship

Highly transformed areas due to urbanisation, intensive agriculture and mining are considered unsuitable for biodiversity conservation as their conservation value is diminished and to save time and money in conservation planning these areas can be ruled out (Driver et al., 2005; von Hase et al., 2003). The higher the level of transformation, the higher the cost of implementing PAs (DEA and SANBI, 2009a).

Generally, Roselands and BBCONR are surrounded by land deemed unsuitable for biodiversity stewardship. The unsuitable land is largely characterised by plantations and cropland. Altered land use through cropping and forestry has a detrimental effect on grasslands (Aguiar, 2005; Ehrlich and Pringle, 2008; Berliner and Desmet, 2007; Biggs et al., 2008). The BSP documentation for both Roselands and BBCONR highlights the plantations and cropland as barriers to natural processes (EKZNW, 2007a). Further supported by the findings of this research using the updated land cover data set and transformation.

Isolated PAs are usually surrounded by radically altered land, and unless the PA is large enough the species within that PA will be threatened as they are unable to migrate and genetically species are limited (Rodrigues, et al., 2004; Dudley et. al, 2005). This is a concern for both Roselands and BBCONR as there is a lack of connectivity and buffer zones, which could hinder the migration of species and genetic diversity. The unsuitable land uses surrounding Umgano are relatively discontinuous and there are vast areas of grassland and bush land uses to the western and north-western side of Umgano (Map C, Figure 5-3).

Areas that avoid threats such as transformed land are seen as priority areas for biodiversity conservation (Cadman et al., 2010). Unsuitable areas surrounding the case study sites is concerning as conservation areas are threatened by other land uses. Conservation areas compete with a number of land uses and it is perceived by many people to slow extraction of resources (Margules and Pressey, 2000; Berliner et al., 2006).

Continuing land transformation and lack of prospect for PAs expansion makes mainstreaming biodiversity within other land uses significant (O'Connor and Kuyler, 2009). The mainstreaming of conservation into the agriculture sector is common practice, specifically for the grassland biome. Biodiversity stewardship aids in the mainstreaming of biodiversity into the production sector, however a notable issue is the lack of infiltration of land use planning. Identifying 'possibly suitable' areas for biodiversity stewardship better infiltrates land use planning. In avoiding unsuitable areas, detrimental effects to biodiversity are minimised and time and money will be saved.

Discussion

Based on land use and transformation, the potential for future biodiversity stewardship sites is examined. The original BSP assessments did not address sites 'possibly suitable' for future biodiversity stewardship.

Stewardship is a key implementation mechanism for biodiversity conservation and is thus a vital component to SCP. Biodiversity stewardship actively secures areas previously not under formal protection (DEA and

SANBI, 2009a). The selection of potential stewardship sites is based on the outcomes of SCP, promoting a spatially efficient stewardship network that achieves conservation objectives. The EKZNW biodiversity stewardship programme actively selects stewardship sites that account for the principles of persistence, representation and spatial efficiency. Consequently, many important grassland areas are secured through biodiversity stewardship. Reviewing the BSP documentation and undertaking the GIS operations enables understanding and verification of the true operational potential of biodiversity stewardship.

The suitability of areas for potential future biodiversity stewardship sites is moderately fragmented within close proximity to both Roselands and BBCONR. The area that immediately surrounds Roselands is identified as mostly unsuitable for biodiversity stewardship due to transformed areas of plantations and sugarcane. The area to the south west of BBCONR is untransformed grassland and is 'possibly suitable' for biodiversity stewardship. 'Possibly suitable' area surrounding Umgano is infrequent. Although Umgano has a fair amount of grassland area surrounding it that is untransformed, there are not many TSCP BPAs nearby Umgano.

Spatial plans such as conservation plans and SDFs can have conflicting results, not making decisions based solely on spatial plans is vitally important and a number of other different variables need to be considered (Dudley et al., 2005). It must be stressed that planning is a guide for action (von Hase et al., 2003; Cadman et al., 2010). It is favourable for biodiversity stewardship sites to fall within priority areas; however, other factors such as the site's representation and persistence are equally as important (BSSA, 2009; McCann, 2011). Determining sites conservation significance involves extensive assessments and consultation with various stakeholders (BSSA, 2009). This is evident in the rigorous assessments undertaken by EKZNW to secure the case study sites for biodiversity stewardship. In addition to meeting targets, the case study sites were selected on the basis that they align with the SCP principles of representation, persistence and spatial efficiency.

Possibly suitable areas for future biodiversity stewardship need to be further evaluated to determine their true operational potential. Further assessment of possibly suitable sites should focus on the principles of SCP to ensure the validity of the sites for biodiversity stewardship.

Representation

Representation ensures that there is a wide range of species represented in a proposed conservation area (Knight et al., 2006). As identified in the BSP documentation Roselands, BBCONR and Umgano have threatened and endangered species the Blue Swallow (*Hirundo atrocaerule*) found at Roselands, the various crane species at BBCONR and the White-winged flufftail (*Sarothrura ayresi*) and threatened grassland ecosystems the Midlands Mistbelt Grassland, the Southern KZN Moist Grassland, Drakensberg Foothill Moist. As discussed by von Hase et al., (2003) the combination of both endangered species occurrence and ecosystem status should be considered for optimal representation of biodiversity (von Hase et al., 2003). Furthermore, having endangered species represented within the biodiversity stewardship site has significance

as a 'draw card' as it positively influences decisions by policy makers, politicians, the wider public, and non-governmental organisations (Dudley et al., 2005).

The 'potentially suitable areas' are identified on the basis that they are priorities areas in terms of the TSCP. BPAs of the TSCP indicate sites of high irreplaceability, and as discussed high irreplaceability is typically driven by threatened and endangered species. While this may be an indication the 'potentially suitable areas' could achieve the principle of representation the areas need to be further assessed to determine their representation of biodiversity.

Persistence

Focusing primarily on representation of species does not guarantee biodiversity conservation, thus to ensure persistence, ecological processes should be considered (Salomona et al., 2006). Persistence requires environmental processes to be maintained so that perseverance is ensured (Knight, et. al, 2006). The biodiversity stewardship assessments undertaken by EKZNW consider ecosystem processes such as the hydrological processes, corridor potential and altitudinal gradients that are important for persistence of biodiversity, specifically grassland biodiversity (EKZNW, 2007a; Knight et al., 2006).

The incorporation of sites with the potential for corridor expansion is a principle the biodiversity stewardship programme aims at achieving (EKZNW, 2009). The connectivity of PAs will allow genetic exchange and migration of species, especially in a change of climate (Berliner et al., 2006). All biodiversity stewardship sites are scrutinised against the spatial corridor expansion plans. The Roselands Nature Reserve is identified as a corridor priority area in terms of the KZN Bioregional Conservation Plan (EKZNW, 2007a). The Roselands Nature Reserve also has an elevation drop from the grassland plateau to the valley bushveld. An elevation change is significant in the adversity of climate change as species would be able to migrate to different altitudes. BBCONR falls within one of the macro-ecological corridors as identified in the KZN Biodiversity Spatial Framework (EKZNW, 2007b).

Umgano is a key site in terms of ecological processes, as the altitudinal gradient that exists is substantial, and this is crucial regarding the migration and dispersal of species between mountain ranges and valleys (EKZNW, 2007c). Seen as a key corridor site, Umgano has the potential to maintain pertinent ecological processes specifically for grassland persistence. The importance of corridor expansion is outlined by Bourne (2011); The Republic of South Africa (2010); Berliner et al., (2006), who all identify the fact that north-south connections and major altitudinal gradients are important in terms of species migrations, genetic exchange and adaptations to changing climates.

As the TSCP uses watersheds to determine the planning units, this better reflects topography and aspect, thus the 'possibly suitable' areas do make some allowance for ecological processes. Again, while this may be an indication the 'potentially suitable areas' could achieve the principle of persistence, the ecological process of the areas need to be further assessed.

Spatial efficiency

To be spatially efficient, conservation areas should achieve a conservation target in a minimum area. In doing so, a number of different aspects such as location, design, size and connectivity are addressed (Margules and Pressey, 2000). Spatial efficiency further requires conflict avoidance (Cadman et al., 2010). The TSCP is based on the Minset output map analysing the irreplaceability map and in conjunction with decision support layers it locates a minimum area requirement to meet targets while simultaneously meeting as many decision objectives as possible (EKZNW, 2010). This addresses the SCP principle of spatial efficiency as the smallest area conserving the highest amount of biodiversity is identified as BPAs. Spatial efficiency also requires conflict avoidance, thus transformed areas are identified and ruled out. Broadly speaking as the ‘potentially suitable areas’ are identified as areas that are BPAs in terms of TSCP and areas that avoid land uses associated with transformation they account for the principle of spatial efficiency.

The identification of ‘possibly suitable areas’ for biodiversity stewardship is only one aspect of planning. While some possibly suitable areas for biodiversity stewardship are evident surrounding the case study sites, the actual selection and implementation of these areas to conservation is multifaceted. Contemporary conservation is characterised by complexity due to multiple role players. Gaining insights into the benefits and barriers to stewardship is key to understanding the merits of stewardship as a mechanism for achieving conservation targets, yet there is limited research on these stakeholder dynamics.

5.4 Conclusion

Reviewing the EKZNW BSP documentation provides an overview of the biodiversity stewardship process and context for this research. The GIS operations, in conjunction with the BSP documentation, gave the researcher insights into the spatial elements of alignment with principles of SCP.

While there is a fair amount of transformation in terms of cropland and plantations surrounding both Roselands and BBCONR, there is also potential for future biodiversity stewardship in the surrounding untransformed grassland areas. The suitable areas, although fragmented, are important for biodiversity conservation, specifically for grasslands. On the other hand, the transformation surrounding Umgano is relatively low but there is a lack of spatial priority areas for conservation.

Holistically, the process of biodiversity stewardship is successful in securing critically biodiversity. There is some potential for biodiversity stewardship in the surrounding areas of the case study sites; however, this potential can only be translated into implementation based on stakeholder involvement, which is examined in the next chapter.

Chapter 6. Stakeholders perceptions

6.1 Introduction

In this chapter, the results and discussion of the final research objective are presented. The stakeholder perspectives on and attitudes to the challenges and opportunities for the successful implementation of biodiversity stewardship in KZN and in South Africa are described and discussed.

Qualitative data was gathered from semi-structured interviews with stewardship landowners and/or managers and attending workshops and discussions with key stakeholders. The stakeholders include biodiversity conservation experts (including private specialists working in the field of biodiversity stewardship conservation, statutory bodies, NGOs and spheres of government) and stewardship landowners and/or managers (usually farmers, but sometimes community owned). The data was subsequently analysed to obtain stakeholder insights into the challenges facing the Biodiversity Stewardship Programme in KZN and South Africa. These stakeholders were also asked to share their perceptions and attitudes on the manner in which implementation prospects of the stewardship programme can be improved to contribute to grassland biome conservation objectives in the province. This enabled a deeper understanding of the stakeholder dynamics in stewardship in KZN and South Africa. This chapter is further structured according to two main stages of the stewardship process, namely (i) site selection and proclamation, which incorporates the steps outlined in Chapter Three i.e. landowner consultation; site assessments; report back; management plans; and proclamation; and (ii) management and follow-up (incorporating the follow-up steps presented in Chapter Three).

For each of these two main stages of the stewardship process, the results are presented and discussed according to the key themes identified during the coding process that broadly relate to the key challenges and obstacles, namely leadership and representation, capacities, funds and resources, motivation, trust and commitment. The opportunities and potential solutions for improvement are presented under the themes of raising awareness, strengthening linkages, and communication. These key themes were specifically chosen as they were reoccurring features of the data set, and a strong pattern of these themes was evident. The key themes identified also relate specifically to the research question to gain an understanding of the implementation prospects of the biodiversity stewardship programme from the perspective of all the stakeholders involved in stewardship and developed insights into how implementation can be improved.

A description of the broader themes and selected quotes that pertain to proclaimed stewardship site selection, proclamation and management are summarised at the end in Table 6-1; Table 6-2. These are analysed against the theoretical framework of SCP and stakeholder dynamics as presented in Chapter 2. The interpretations of the results are obviously open to contestation and re-interpretation by other researchers and practitioners.

6.2 Obstacles and risks to site selection, proclamation and management

From the stakeholder's perceptions, there are many reoccurring themes pertaining to the obstacles and risks to site selection and proclamation and management. Each theme identified from the range of perceptions and biodiversity stewardship experience (i.e. CapeNature) are presented and then a discussion supported by 'theory' as presented in Chapter Two are examined below.

Lack of funding, restricted knowledge, vast conservation targets and urgency for action are restrictions facing the conservation process (Salomona et al., 2006). Similarly, the biodiversity stewardship programme is faced with leadership and representation issues, lack of capacity, funds, resources, landowner motivation, trust and commitment.

6.2.1 Leadership and representation

Political will, corruption, bureaucracy and poor working relationships were the reoccurring issues to site selection and proclamation described by the stakeholders (summarised in Table 6-1). The issues addressed by the stakeholders pertaining to the management of the biodiversity stewardship sites include maintenance and monitoring, multifaceted support, skills transfer to landowner, and landowner compliance with legislation (Table 6-1). These perceptions are presented below and then discussed accordingly.

As perceived by the stakeholders involved in the case study sites, during the site selection and proclamation of the biodiversity stewardship sites there is a need for better leadership and representation. Politically, there are obstacles for biodiversity stewardship. As conservation is not a priority for government, there is a lack of political buy-in to a mechanism such as biodiversity stewardship (Respondent K., pers. com., 2011).

“One of the biggest challenges of biodiversity stewardship programme is to obtain political buy-in and to convince the MEC to achieve national targets by using biodiversity stewardship as an implementation mechanism” (Respondent K, pers. com., 2011).

Additionally, bureaucracy is a drawback to the site selection and proclamation of biodiversity stewardship. Bureaucracy is the over-regulation and following of processes, which leads to time delays. Bureaucracy is the source of much contention and the reason some of the stakeholder wished to remain anonymous. Identified by the biodiversity conservation experts (provincial biodiversity stewardship practitioners) and the stewardship landowners and/or managers (farmers and stewardship representatives), bureaucracy is a controversial issue:

“Political bureaucracy and red tape relating to the implementation of biodiversity stewardship is one of its biggest downfalls” (Respondent A, pers. com., 2011).

The bureaucratic process of the implementation of biodiversity stewardship is characterised by lengthy procedures locally, provincially and nationally and no straightforward method exists (Respondent A, pers. com., 2011). The bureaucratic process is apparent in decision making, specifically internally through

EKZNW the provincial environmental body (Respondent N, pers. com., 2011). Some of the biodiversity stewardship properties took over two years to be proclaimed causing stakeholders involved to become frustrated (Respondent A, pers. com., 2011).

Not only is bureaucracy a limitation of biodiversity stewardship but also establishing working relationships with stakeholders is difficult. Biodiversity stewardship can be entered into in a proactive or reactive way (Respondent A, pers. com., 2011). When a landowner approaches the biodiversity stewardship practitioner and wants to enter into the programme that is a proactive approach, this was the case for both BBCONR and Umgano (Respondent A, pers. com., 2011). The limitation associated with this approach is that the land may not have biodiversity conservation significance (Respondent A, pers. com., 2011). A reactive approach is if significant biodiversity features are found within the landowner's property, for example, a property may have an endangered species breeding ground, and the biodiversity stewardship practitioner approaches the landowner to enter into biodiversity stewardship, this was the case for Roselands Nature Reserve. Although a limitation of this is that the landowner may not be willing to commit to stewardship, the Roselands landowners showed willingness to commit to stewardship (Respondent A, pers. com., 2011).

Often there are conflicting ideas with regard to assessments of biodiversity stewardship sites where for example landowners often feel their land is more valuable (Respondent B, pers. com., 2011). In Mpumalanga, landowners with land of biodiversity significance became despondent after overgrazing was identified as a major threat to biodiversity by an assessment done by the Mpumalanga Tourism and Parks Agency (MTPA). The despondency of the landowner was due to the assessment highlighting their current farming practice to threaten biodiversity. Frustration of landowners results in them departing from the stewardship programme, which is detrimental to conservation of that land (Respondent B, pers. com., 2011).

The issues relating to leadership and representation during management of the biodiversity stewardship are identified by the stewardship landowners and/or managers. The signing of new sites for biodiversity stewardship is relatively easy, the maintenance and monitoring of the sites is much more challenging (Respondent E, pers. com., 2011). Continuation of support post proclamation is multifaceted and a lot of time and expertise is invested (Respondent A, pers. com., 2011).

Biodiversity stewardship is complex and the transfer of skills such as grassland conservation management in terms of grazing and burning to the landowner is a major challenge (Respondent A, pers. com., 2011). The private landowner is expected to be a conservationist once the stewardship site has been proclaimed (Respondent A, pers. com., 2011). The biodiversity stewardship sites are not going to be perfectly managed reserves the day after proclamation (Respondent A, pers. com., 2011). Not only do landowners need support in terms of addressing management objectives but they also require support in adhering to legislation such as NEM: PAA (Respondent J, pers. com., 2011). In adhering to legislation, the landowner will be required to follow the guidelines in terms of restricting certain activities and meeting management objectives (Respondent J, pers. com., 2011).

“Conforming to the legislation post proclamation requires improved support from the provincial conservation authority, in this case EKZWN” (Respondent J, pers. com., 2011).

The lack of follow up and support by EKZWN in terms of the management of the biodiversity stewardship site is concerning especially as the conservation of biodiversity is at stake (Respondent M, pers. com., 2011).

Table 6-1: Overview of leadership and representation as an obstacle during site selection and proclamation and management

Obstacles	Site selection and proclamation	Site management
Leadership and representation:	<p><u>Political will:</u></p> <ul style="list-style-type: none"> -conservation not a priority for government -lack of political buy in. <p><u>Bureaucracy:</u></p> <ul style="list-style-type: none"> -overregulation and following of processes; -contentious and controversial issue; -lengthy procedures creating distrust and dissatisfaction. <p><u>Poor working relationships:</u></p> <ul style="list-style-type: none"> -process of entering into stewardship (proactive or reactive stewardship); -conflicting ideas pertaining to site assessments. 	<p><u>Maintenance and monitoring:</u></p> <ul style="list-style-type: none"> -requires time, capacity and expertise. <p><u>Support is multifaceted:</u></p> <ul style="list-style-type: none"> - A number of different stakeholders players. <p><u>Transfer of skills to landowner:</u></p> <ul style="list-style-type: none"> -grassland conservation management in terms of burning and grazing requires training and transfer of skills. <p><u>Landowner compliance with legislation:</u></p> <ul style="list-style-type: none"> -need to adhere to NEM:PAA, restrictions on certain activities and meeting of management objectives.

Discussion

Political commitment to conservation initiatives in South Africa is superficial and conservation is not a priority (Chape et al., 2005). Poor political involvement makes resource allocation within the provincial conservation bodies difficult (Goodman, 2003). DEA is committed to supporting biodiversity stewardship by co-ordinating human resources, making funding available to the implementing agencies and building political support but political buy-in is not well achieved (EKZWN, 2009; Olivier, 2011; Respondent K, pers. com., 2011). As professed by several stakeholders, political commitment is a major limitation to the biodiversity stewardship programme in South Africa.

A reoccurring limitation identified by the biodiversity conservation experts (provincial biodiversity stewardship practitioners) and the stewardship landowners and/or managers is bureaucracy, specifically with regard to the site selection and implementation stage. Bureaucracy is apparent in the environmental sector in South Africa mainly due to the relatively new environmental legislation and the interpretation of it (Meyer, 2007). The process of entering into the biodiversity stewardship process is lengthy and drawn out, and landowners can get frustrated (Respondent A, pers. com., 2011). This is often out of the hands of the

provincial body as it is hindered by a bureaucratic system. The biodiversity stewardship programme in Mpumalanga driven by MPTA identifies the time consuming nature of the biodiversity stewardship process as a principal limitation (Morris, 2011). Respondent A (pers. com., 2011) identified bureaucracy as biodiversity stewardship's greatest downfall as some properties take years to be declared, creating frustration among landowners.

Outlining the bureaucratic nature of biodiversity stewardship at the outset will ensure landowners are aware of time delays and have a better understanding of the processes (BSSA, 2009; McCann, 2011). As the process of entering into the biodiversity process is lengthy and drawn out, it is important to keep a positive approach with landowners and keep them well-informed (Morris, 2011). Steyn (2011) identifies the need to outline the time consuming nature as due not to incompetence but to due diligence as there are a number of procedures and steps required to meet the legislative requirements.

Despite the limitations in terms of bureaucracy, the environmental legislation guiding biodiversity stewardship is one of its key strengths making it a viable programme for conservation of biodiversity. The fundamental building block for biodiversity conservation is legislation (EZKNW, 2008; Reeves and Marom, 2009). Legislation is well rounded but implementation is inefficient (Mucina et al., 2006; DEAT, 2005). The legality of biodiversity stewardship can also be an obstacle as the onus is upon the landowner to conform to a myriad of legislation including NEM: BA and NEM: PAA (Respondent J, pers. com., 2011; Reeves and Marom, 2009).

The continuation of support post proclamation is multifaceted as a great deal of time and expertise is invested (Respondent A, pers. com., 2011). The management stage of conservation is considered the most demanding of the stages as it continues for a very long period of time (Margules and Pressey, 2000). The transfer of conservation management skills to the landowner is a major challenge as the private landowner is expected to be a conservationist (Respondent A, pers. com., 2011). In general, although landowners understand the management objectives they are not confident enough to manage their land in an environmentally sustainable way. Landowner confidence is based on a deeper understanding of stewardship, a better understanding in terms of biodiversity conservation, legislation and natural vegetation reduces uncertainties, better equipping the landowner to make pro-environmental decisions (Rossouw, 2012).

Landowners who enter the stewardship programme reactively due to the identification of the importance of their land are often difficult and unwilling (Rossouw, 2012; Respondent A, pers. com., 2011). Furthermore, reactive stewardship depletes the limited provincial conservation authority resources as unwilling landowners require extra time and regulation (Rossouw, 2012). Establishing working relationships with landowners is challenging. Unwilling landowners show lack of commitment and have conflicting interests, this is identified by Reed, (2008); Pelsler et al., (2009) as the primary causes for unsuccessful conservation initiatives.

Landowners who enter into the stewardship programme proactively are more willing and generally have a positive outlook on stewardship (Respondent A, pers. com., 2011). To achieve better implementation of conservation initiatives and sustained on-ground outcomes for conservation, there is a need for shared vision and collaboration among diverse stakeholders (Biggs et al., 2011). Stakeholder collaboration is seen as an effective way to improve conservation initiatives as stakeholders roles and responsibilities, power and duties are shared (Knight et al. 2006; Jamal and Stronza, 2009). Stakeholder collaboration in the biodiversity stewardship programme would help reduce the limitations in terms of capacity as different stakeholders can take on different roles all working towards a common goal. Although there is some evidence of stakeholder collaboration in the biodiversity stewardship programme there is scope for even more. As collaborative management is flexible active learning can take place biodiversity stewardship can greatly benefit especially in terms of reliance on NGOs (Carlssona and Brkes, 2005).

Strongly linked to representation and leadership is capacity. Lack of capacity can result in poor leadership and representation. This is detrimental to the functioning and sustainability of biodiversity stewardship.

6.2.2 Capacities

The reoccurring issues to site selection and proclamation described by the stakeholders include lack of capacity and support, skills and training, too few personal and high staff turnover (Table 6-2). The issues addressed by the stakeholders pertaining to the management of the biodiversity stewardship sites include lack of capacity and support, roles and responsibility solely on landowner and lacking extension in the field (Table 6-2). These perceptions are presented below and then discussed accordingly.

During the site selection and proclamation it is argued by several stakeholders that in most provinces, a lack of capacity is a major limitation of biodiversity stewardship. The lack of capacity is the inability to perform tasks due to a number of different factors such as unskilled personnel, too few personnel, and inadequate budget. Within all provincial conservation bodies, there is an apparent lack of support and capacity for biodiversity stewardship during the site selection and proclamation of new sites (Respondent E, pers. com., 2011).

“In most provinces in South Africa, biodiversity stewardship lacks skilled individuals in administrating and implementing biodiversity stewardship” (Respondent A, pers. com., 2011).

Similarly, there are too few biodiversity stewardship practitioners in EKZMW to assess and proclaim new biodiversity stewardship sites (Respondent A., pers. com, 2011). As biodiversity stewardship gains more momentum, the capacity of the biodiversity stewardship practitioners is diminished (Respondent K, pers. com., 2011). When the biodiversity stewardship practitioner takes on more sites, more time, and expertise is required in the follow-up and management of these sites, and capacity is diminished for signing of new sites.

The administration and implementation of biodiversity stewardship requires vast expertise, specifically relating to the site assessments and proclamation procedures. The expertise essential for successful implementation include extensive knowledge of ecology, legal proceeding and laws, good interpersonal skills and an understanding of conservation (Respondent A, pers. com., 2011; Respondent C, pers. com., 2011). Commonly the expertise needed for biodiversity stems from years of experience, and key personal with that sort of expertise and experience are an asset to the biodiversity stewardship programme (Respondent C, pers. com., 2011).

The departing of biodiversity stewardship practitioners from provincial institutions and conservation bodies is a major constraint not only because of their institutional memory but also because of their relationships already built with other stakeholders (landowners and NGOs) (Respondent G, pers. com., 2011, Respondent H, pers. com., 2011). Staff turnover is a lengthy procedure as the new staff member learns procedures and builds relationships with relevant stakeholders (Respondent G, pers. com., 2011).

Capacity is also a reoccurring issue identified by the stakeholders during the management phase of biodiversity stewardship. The drafting of management plans and following through with them is a challenge for many landowners (Respondent A, pers. com., 2011). Despite the various management incentives such as IAS control and burning, the roles and responsibility in terms of management fall solely on the landowners (Respondent J, pers. com., 2011). Although the biodiversity stewardship programme offers support and advice in this regard, it has not been well-achieved (Respondent N, pers. com., 2011).

“The lack of personnel in the field causes lack of motivation and commitment to stewardship”
(Respondent M, pers. com., 2011).

The follow-up system and capacity of EKZWN is seen as a major downfall to the biodiversity stewardship programme (Respondent K, pers. com., 2011). The feeling in general is that once the land is declared, there was lack of follow-up by the conservation authority (Respondent K, pers. com., 2011; Respondent M, pers. com., 2011). As evident for Roselands Nature Reserve as there has been no follow up from the provincial stewardship practitioner since proclamation in July 2010 (Respondent D, pers. com., 2011).

The poor support post-proclamation is owed to lack of capacity of the conservation authority (Respondent A, pers. com., 2011). CapeNature, MPTA and EKZWN are overshadowed by a lack of capacity, representation, and lack of skills and loss of expertise (Respondent J, pers. com., 2011). The stakeholders' at all three sites were aware that EKZWN is extremely under-resourced and that capacity is a major issue (Respondent K, pers. com., 2011; Respondent M, pers. com., 2011). Regarding this, Respondent K (pers. com., 2011) was concerned about increasing the amount of cattle grazing the grassland and was unsure whether it would degrade the grassland. Despite having a management plan, readily available advice and expertise of the management principles are lacking (Respondent M, pers. com., 2011).

“Monitoring of the biodiversity stewardship site post proclamation and ensuring the management objectives are met will ensure security of biodiversity” (Respondent M, pers. com., 2011).

Respondent K pers. com (2011) suggests that there should be annual assessments on how the management objectives are being achieved. A stewardship extension officer solely for proclaimed stewardship sites could be employed to engage with landowners and offer advice and support (Respondent K, pers. com., 2011). In addition to this, to improve on sharing of expertise and advice, stakeholder engagement workshops could be undertaken for all involved in stewardship; this will enable the sharing of successes and failures.

Table 6-2: Overview of capacities as an obstacle during site selection and proclamation and management

Obstacle	Site selection and proclamation	Site management
Capacities:	<p><u>Lack of capacity and support:</u> -inability to perform tasks; -due to unskilled personnel, too few personnel and inadequate budget; -capacity of practitioner diminished as more sites are taken on.</p> <p><u>Skills and training:</u> -administration and implementation requires knowledge of ecology, legal procedures, conservation understanding and interpersonal skills.</p> <p><u>Too few personal:</u> -Due to budget constraints; -Lack of skilled personnel.</p> <p><u>High staff turnover:</u> -departing of stewardship practitioners with institutional memory and relationships already built</p>	<p><u>Lack of capacity and support:</u> -roles and responsibility solely on landowner; -Lacking extension in the field; -provincial body is too under resourced; -poor support post-proclamation.</p>

Discussion

Capacity and poor co-ordination are challenges facing biodiversity conservation in South Africa (Cowling et al., 2003). The planning and implementation of grassland biome conservation stretch across numerous administrative boundaries (Berliner et al., 2006). Legislation is well rounded but implementation is inefficient and conservation of grasslands is not completely based on systematic conservation principles (Mucina et al., 2006; DEAT, 2005). The lack of capacity of the different levels of government acquiring land for grassland conservation is a primary limitation. Similarly, a central theme with all biodiversity stewardship case study sites is the lack of capacity. High staff turnover and loss of skilled individuals results

in capacity constraints in terms of achieving good extension in both implementation and management, creating dissatisfaction among landowners (Respondent A, pers. com., 2011; Haywards, 2011; Geldenhuys, 2011). Biodiversity stewardship is based on a good working relationship between multiple stakeholders and high staff turnover causes mistrust between the landowners and the provincial authority (Hayward, 2011; Respondent A, pers. com., 2011). Skilled individuals with institutional memory, extensive knowledge of ecology, legal proceeding and laws, good interpersonal skills and an understanding of conservation leaving the conservation body for better jobs or retiring is renowned in many provincial departments (Respondent A, pers. com., 2011; Respondent C, pers. com., 2011).

Capacity limitations are common in the continuation of support post-proclamation as a great deal of time and expertise is required (Respondent A, pers. com., 2011). Both EKZNW and CapeNature are too understaffed to maintain current stewardship sites or sign on more sites. As the support base is spread too thin, there is frustration among landowners (Hayward, 2011; Geldenhuys, 2011).

Some of the case study site stakeholders indicated there was no structured and continuous follow-up to the biodiversity stewardship sites (Respondent K, pers. com., 2011; Respondent M, pers. com., 2011). The landowner of the Roselands Nature Reserve was unsure of grazing techniques pertaining to the grazing rotation of the cattle, which could emerge as threat to the grassland biodiversity. Poor fire and grazing management is a key threat to grassland biodiversity (Biggs et al., 2008; Donaldson, 2002). To improve on sharing of expertise and advice, stakeholder engagement workshops could be undertaken for all involved in stewardship: this will enable the sharing of knowledge pertaining to management objectives as well as a sharing of successes and failures. The stakeholders' at all three case study sites were aware that EKZNW is extremely under-resourced and that capacity is a major issue, nonetheless it translates into a serious threat to biodiversity (Respondent K, pers. com., 2011; Respondent M, pers. com., 2011).

The effectiveness of a PA as a tool for conservation is determined by how well managed it is and whether the species and habitats are retained (Dudley et al., 2005). Many PAs worldwide and in South Africa are under threat or are experiencing degradation through poor management (Dudley et al., 2005). The management effectiveness of PAs is seldom evaluated; this causes scepticism amongst funding agents such as WWF, politicians and policy makers (Parrish, Braun and Unnasch, 2003). Annual assessments on how the management objectives of biodiversity stewardship sites are being achieved should be undertaken by the conservation authority. Subsequently further assistance and advice on how best to achieve the management objectives could further relieve some of the landowner's dissatisfaction (Respondent D, pers. com., 2011). Additionally a stewardship extension officer solely for proclaimed stewardship sites could be employed to engage with landowners and offer advice and support (Respondent K, pers. com., 2011).

Taking on fewer sites and servicing them properly will ensure that the follow-up support of sites is improved (Steyn, 2011). Guaranteeing transparency with stakeholders, the limitations relating to capacity and

availability of resources ought to be explained to the landowner (BSSA, 2009). Lack of capacity is strongly linked to funds and resources.

6.2.3 Funds and resources

High implementation costs and limited budget are the reoccurring issues to site selection and proclamation described by the stakeholders. The issues addressed by the stakeholders pertaining to the management of the biodiversity stewardship sites include maintenance costs being the landowners' responsibility and insufficient support financially (Table 6-3). These perceptions are presented below and then discussed accordingly.

Linking with capacity constraints is the issue of budget, particularly identified by the biodiversity conservation experts during the site selection and proclamation stage of biodiversity stewardship. Financially there are many costs involved in implementation of biodiversity stewardship. The provincial authorities absorb many of the costs associated with biodiversity stewardship including legal fees required for the proclamation process, operational costs, costs of sites assessments and cost of drafting management plans. Site assessments require skilled internal and external consultants to do the assessments, which is a cost to the provincial body. However, budget for biodiversity stewardship limits the programme from achieving its full potential (Respondent M, pers. com., 2011). In KZN, there is reallocation of the provincial budget for conservation if it is not spent (Respondent A, pers. com., 2011). There is no security in receiving budget for the following year. Despite the progress biodiversity stewardship had achieved in 2009, it is unexplained why EKZNW received a major cut in the 2010 budget (Respondent I, pers. com., 2011). Financial limitations are a major hindering factor to biodiversity stewardship.

Although the costs associated with implementing biodiversity stewardship are high, it is more cost effective than buying land for conservation. Biodiversity stewardship per hectare is more cost effective than land acquisition through a 'willing seller - willing buyer' case (Respondent I, pers. com., 2011). According to Respondent I pers. com., (2011) biodiversity stewardship is calculated to be approximately one hundred South African Rands per hectare as opposed to direct land acquisition that is approximately four thousand South African Rands per hectare.

As perceived by the stewardship landowners and/or managers, funds and resources are also a factor hindering biodiversity stewardship during the management stage. The majority of costs in terms of maintenance and operational costs are the landowner's responsibility (Respondent J, pers.com, 2011). The maintenance of the sites involves fencing, burning of firebreaks, IAS clearing which are all importance practices for sustaining a healthy grassland biome. All three biodiversity stewardship sites did receive some outside assistance from WfW in the form of IAS particularly black wattle (*Acacia mearnsii*) and American bramble (*Rubus cuneifolius*) chemical and mechanical clearing and training in their clearing; it was not

sufficient as the support was inconsistent and IAS requires constant management (Respondent M, pers. com., 2011).

“For the biodiversity stewardship properties to realistically meet conservation targets, there ought to be improved support financially, specifically because the finances directly affect capacity” (Respondent J, pers. com, 2011).

Financially, the conservation bodies are limited and reliance on other partnerships specifically with NGOs, such as WWF and EWT is becoming more significant (Respondent C, pers. com., 2011). NGOs take a significant financial burden off the conservation agency and the landowner (Respondent K, pers. com., 2011).

Table 6-3: Overview of funds and resources as an obstacle during site selection and proclamation and management

Obstacle	Site selection and proclamation	Site management
Funds and resources:	<p><u>High implementation costs:</u> -many costs involved in implementing biodiversity stewardship; -legal fees, operational costs, site assessment costs and cost of drafting management plans;</p> <p><u>Limited budget:</u> -No security in receiving budget; -Budget often reallocated.</p>	<p><u>Maintenance and costs are landowners responsibility:</u> -sustaining a healthy grassland in terms of fencing and burning of firebreaks is the landowners responsibility; -Some support from provincial body and NGOs but insufficient.</p> <p><u>Insufficient support financially:</u> -Finances affect capacity; -Heavy reliance on NGOs financially.</p>

Discussion

Biodiversity stewardship has numerous costs. Legal proceedings, site assessments, IAS clearing and drafting management plans are expensive endeavours (Olivier, 2011). Funding of biodiversity stewardship in all provinces is a restraining factor, for example in MTPA, funding is not available despite the need for more biodiversity stewardship officers (Respondent I, pers. com., 2011; Morris, 2011). Similarly, EKZNW is lacking in resources, personnel and budget (EKZNW, 2009). Poor budget for biodiversity stewardship limits the programme from achieving its full potential (Respondent M, pers. com., 2011). Provincial budget for conservation not well spent is reallocated to different provincial departments, such as to the department of human settlements or education. South Africa is inundated with a backlog of service delivery, low budgets and lacking capacity and biodiversity conservation holds the least importance (Pierce et al., 2005). Despite the progress of biodiversity stewardship, there is no security in receiving a budget for the following year (Respondent I, pers. com., 2011).

Although the implementation costs of biodiversity stewardship are high, biodiversity stewardship is still financially a better option than having to purchase land for conservation. Land price correlates with competing land uses such as cultivation, mining or urban expansion, and the land price will be higher if land has economic potential; this is particularly apparent in the Grassland and Fynbos biome (The Republic of South Africa, 2010). As land acquisition for conservation is very expensive, a mechanism such as biodiversity stewardship is a cost effective alternative as landowners commit to conservation and take management into their own hands (Purnell, 2008; Ferrar, & Lötter, 2007).

Conservation areas should be selected with maximum coverage and with a minimum cost; however, acquisition of land is expensive (Sarkar et al., 2006). Biodiversity stewardship achieves the principle of maximum coverage at minimum cost, as per hectare it is cheaper than buying the land for conservation (Respondent I, pers. com., 2011). Biodiversity stewardship sites therefore take a significant financial burden off provincial conservation authorities and agencies managing the land (Purnell, 2008; Respondent D, pers. com., 2011).

The final stage of stewardship of follow up and support, is the most important phase as real protection and adequate management should be practised (BSSA, 2009; Reeves and Marom, 2009; McCann, 2011). All efforts that were put in to drawing up the management strategy should be followed through. Funds and resources for biodiversity stewardship are important particularly for maintenance and management of the site (Respondent J, pers. com, 2011). Issues relating to fencing, IAS clearing, grazing practices and burning are outlined in the biodiversity stewardship site management plans.

All three biodiversity stewardship sites did receive some outside assistance in terms of site management. Identifying sustainable ways of managing grassland biodiversity without hindering agricultural development is important (Biggs et al., 2008). Some of the management objectives include strict rotating regimes for grazing of livestock and assistance with IAS clearing (McCann, 2011). Improvement in farm management has a positive effect on biodiversity, particularly grassland biodiversity (Donaldson, 2002). Biodiversity loss in grasslands is not necessarily from grazing and agriculture, but the result of poor grazing and agricultural practice as the grasslands are overgrazed or do not have the correct fire burning regime (Donaldson, 2002). Proper management of grasslands will allow species diversity to recover and persist (Aguiar, 2005). Controlling grazing practices and stocking rates is important for grassland composition (Gitzen et al., 2010). Although the management plans for the case study sites drawn up by EKZNW address grazing rotation the follow up and support is poor, this in effect has a detrimental effect to biodiversity.

IAS clearing is also vitally important to grassland conservation as grasslands are susceptible to IAS, especially if it is disturbed or degraded (White et al., 2000). All three sites had assistance in the form of IAS chemical and mechanical clearing and training in IAS clearing; it was not sufficient as the support was inconsistent and IAS requires constant management (Respondent M, pers. com., 2011). The implications of having poor support and follow up are notable in term of grassland conservation (Donaldson, 2002).

Funds and resources are essential for effectively implementing and managing biodiversity stewardship sites, the motivation, trust and commitment of the stakeholders involved is a factor equally as important.

6.2.4 Motivation, trust and commitment

The reoccurring issues pertaining to motivation, trust and commitment for site selection and proclamation described by the stakeholders include poor landowner commitment and incentives driving commitment (Table 6-4). The issues addressed by the stakeholders pertaining to the management of the biodiversity stewardship sites comprise high staff turnover, multiple stakeholders' disagreements and political uncertainty (Table 6-4). These perceptions are presented below and then discussed accordingly.

As noted with the theme of leadership and representation, landowner commitment to conservation is a chief concern during the site selection and proclamation of biodiversity stewardship. Landowner fears regarding aspects such as political instability should be addressed upfront (Respondent A, pers. com., 2011). Landowner commitment is often dictated by the incentives offered. Many landowners only enter into biodiversity stewardship to obtain the tax and rate rebates incentives. Incentives can prove to be a limiting factor to biodiversity stewardship (Respondent A, pers. com., 2011). "The principal motivation for entering into the biodiversity stewardship programme for most landowners is to get the rates and tax exemption" (Respondent N, pers. com., 2011). For the BBCONR and the Roselands Nature Reserve, the incentives in terms of municipal rates rebates played a part in the desire to enter into biodiversity stewardship (Respondent M, pers. com., 2011; Respondent J, pers. com., 2011; Respondent K, pers. com., 2011). Concern is thus raised that conservation will not be the top priority of the landowner (Respondent N, pers. com., 2011; Respondent M, pers. com., 2011). The economic benefit is what is driving the process and it can be very precarious as landowners owning land with little or no conservation value want to be included in the biodiversity stewardship programme (Respondent N, pers. com., 2011).

Incentives should be appropriate for the level of conservation of the land and the level of commitment of the landowner (Respondent A, pers. com., 2011). Incentives involving management are seen to be more effective in terms of meeting conservation criteria (Respondent M, pers. com., 2011).

During the site management stage of biodiversity stewardship the motivation trust and commitment of those involved is described by the stakeholders as a limitation. Staff turnover is common and can lead to distrust and insecurity by the landowners (Respondent G, pers. com., 2011, Respondent H, pers. com., 2011). Relationships formed between the stakeholders and the biodiversity stewardship practitioner are built on trust and mutual understanding (Respondent K, pers. com., 2011). The exiting of such a practitioner creates dissatisfaction and distrust by the landowner (Respondent K, pers. com., 2011).

"Future effectiveness of biodiversity stewardship is dependent on consistent support from the implementing agencies and long term commitment from landowners, both of which are never guaranteed" (Respondent E, pers. com., 2011).

Complications arise when multiple stakeholders are involved, as in the case of the biodiversity stewardship process regarding BBCONR. Agreements existed between multiple landowners, the NGO South Africa Crane Working Group (SACWG) and EKZMW. There were conflicting ideas between agreements and management plans in terms of grazing capacities and BBCONR landowners started to question whether biodiversity stewardship would threaten their land affairs as they may not be permitted to undertake certain agricultural activities on the land (Respondent J, pers. com., 2011). There was concern raised over the grazing capacity by the landowners as it was thought that the grazing capacity would be substantially lower; however, this was not the case, it was resolved by getting expert opinion on the grazing and management regime of the specific grasslands encapsulated in the BBCONR (Respondent J, pers. com., 2011).

Table 6-4: Overview of motivation trust and commitment as an obstacle during site selection and proclamation and management

Obstacle	Site selection and proclamation	Site management
Motivation trust and commitment:	<u>Poor landowner commitment:</u> -Incentives driving commitment; -rates and tax exemptions are appealing -incentives should be appropriate for level of commitment.	<u>High staff turnover:</u> -Leads to loss of institutional memory, causing distrust and insecurity of landowners; -stakeholder relationships built on trust. <u>Multiple stakeholders disagreements:</u> -disagreements in term of grazing management, landowner ‘reserves good land for grazing not conservation’; -resolved by external expert opinion. <u>Political uncertainty:</u> -fears in terms of political instability

Discussion

Margules and Pressey (2000) identify the commitment to conservation as an important factor to consider in the selection of additional reserves. Lack of commitment among stakeholders, internal tensions and conflicting interests of stakeholders are the primary causes for unsuccessful conservation initiatives (Reed, 2008; Pelsler et al., 2009). Although landowner attitude, needs, obstacles and how they best fit into biodiversity stewardship are assessed by EKZMW during the site assessments, landowner commitment issues are apparent (BSSA, 2009; McCann, 2011; Respondent J, pers. com., 2011). Landowner commitment issues and landowner unwillingness is identified as a limitation to the biodiversity stewardship programme (Respondent J, pers. com., 2011; Respondent A, pers. com., 2011).

Scepticism by landowners about ‘restrictions’ on farming practices is identified by CapeNature as a drawback; it is therefore vitally important to provide technical information in such cases so that the positive relationship is maintained (Hayward, 2011; Geldenhuys, 2011). BBCONR landowners questioned the effect

of conservation efforts on grazing capacity, in addressing this issue a VCA offered technical support, identified the best practice grazing, and resolved the landowners concerns (Botha, 2009; Respondent J, pers. com., 2011).

Reluctance to enter into long-term agreements and a refusal to commit to future generations due to political uncertainty is common (Hayward, 2011; Geldenhuys, 2011). Landowner fears regarding aspects such as political instability should be addressed upfront (Respondent A, pers. com., 2011). According to SANBI, a (2009b) fear of nationalisation among white farmers has caused widespread concern. It must be stressed to the landowner that biodiversity stewardship is not a strategy for land expropriation and the landowner will retain all the rights to the land (BSSA, 2009; McCann, 2011; Olivier, 2011). If the regulations in terms of the Constitution amount to land expropriation, then full compensation must be paid out (EKZNW, 2009b). Land expropriation is unlikely as while the Constitution provides redistributive land reform it also provides for the protection of property rights (The Republic of South Africa. 1996).

The position of the South African cabinet on land restitution claims within protected areas addresses various aspects. The land is to be solely used and maintained for conservation purposes and activities. According to NEM: PAA, the continued management of the PA is still the responsibility of the state conservation authority and it is governed by legislation and management plans (The Republic of South Africa. 2003).

Numerous landowners know the worth of biodiversity stewardship for conservation but also enter into the programme for the incentives and marketing (Hayward, 2011; Geldenhuys, 2011). The incentives offered encourage both commercial landowners and community-based indigenous landowners to want to manage their land in a conservation-friendly manner (Respondent N, pers. com., 2011; Respondent M, pers. com., 2011).

The incentives vary according to the biodiversity stewardship category. Incentives include tax and rates rebates, technical advice and assistance from the conservation authority, chemical and physical IAS clearing, fencing, fire control, game management and lobbying assistance from other organisations and public works initiatives (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). Incentives such as the rates and tax exemption can be a limiting factor as conservation is not the priority of the landowner and incentives prove to be the principal motivation for entering into the biodiversity stewardship programme (Respondent N, pers. com., 2011). In terms of the Municipal Property Rates Act, (Act 6 of 2004) provisions are made for compensation for landowners who conserve their properties and some of the biodiversity stewardship categories are entitled to municipal rates rebates (The Republic of South Africa, 2004a). Municipal rates rebates played a part in the desire to enter into biodiversity stewardship for both the BBCONR and Roselands Nature Reserve (Respondent M, pers. com., 2011; Respondent J, pers. com., 2011; Respondent K, pers. com., 2011). Having an economic benefit driving the conservation process can be problematic, as landowners owning land with little or no conservation value want to be included in the biodiversity stewardship programme (Respondent N, pers. com., 2011).

Addressing this issue, incentives involving management are seen to be more effective in terms of meeting conservation criteria (Respondent M, pers. com., 2011). Management incentives such as IAS clearing, technical advice for management of grasslands, and fire management, are seen as more beneficial for biodiversity conservation (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009). That said Umgano, Roselands Nature Reserve and BBCONR had support in IAS clearing and grassland management (Respondent I, pers. com., 2011).

The management of area under biodiversity stewardship is clearly outlined and support and tangible benefits are readily available to the landowner (Reeves and Marom, 2009; BSSA, 2009; EKZNW, 2009). Practising sustainable use of resources and implementing proper management to ensure persistence of biodiversity is essential for conservation (Dudley et al., 2005; Biggs et al., 2008). Biodiversity stewardship promotes better land use management, as landowners are provided with technical support in managing their land in a sustainable manner (Respondent E, pers. com., 2011). This is a contradiction of the findings from other stakeholders who felt that the technical support in managing their land was not suffice, this shows the differing perspectives on biodiversity stewardship.

Table 6-5: Overview of broad themes of obstacles and risks for site selection, proclamation and management

	Site selection and proclamation	Site management
Obstacles		
Leadership and representation:	Political will Bureaucracy Poor working relationships	Maintenance and monitoring is a challenge Support is multifaceted Transfer of skills to landowner Landowner compliance with legislation
Capacities:	Lack of capacity and support Skills and training Too few personal High staff turnover	Lack of capacity and support roles and responsibility solely on landowner Lacking extension in the field
Funds and resources:	High implementation costs Limited budget	Maintenance and costs are landowners responsibility Insufficient support financially
Motivation trust and commitment:	Poor landowner commitment Incentives driving commitment	High staff turnover Loss of institutional memory Multiple stakeholders disagreements Reserve good land for themselves Political uncertainty

6.3 Opportunities and strengths

Although there are many reoccurring themes pertaining to the obstacles and risks to the process of site selection, proclamation and management, there are also a number of opportunities and strengths as identified by the range of perceptions and biodiversity stewardship experience. The opportunities and potential solutions for improvement for effective selection, proclamation and management of biodiversity stewardship sites including raising awareness and strengthening linkages and communication are presented below and then discussed and supported by theory as presented in Chapter Two.

6.3.1 Raising awareness

The reoccurring opportunities and strengths pertaining to raising awareness include the fact that biodiversity stewardship is a primary mechanism for PAES and can be recognised as a successful programme. It is useful as a marketing tool and branding and to raise awareness there can be a sharing of success stories (Table 6-6). The opportunities addressed by the stakeholders pertaining to the management of the biodiversity stewardship sites include raising awareness and recognition, inclusion in organisation needs to better achieved and improved sharing of knowledge (Table 6-6). These perceptions are presented below and then discussed accordingly.

As perceived by the stakeholders, raising awareness during the process of site selection and proclamation is a key opportunity. The best option for the NPAES in SA is to have a willing seller and a willing buyer, however, this is both rare and costly (Respondent C, pers. com., 2011). One of the main mechanisms for protected area expansion is biodiversity stewardship (Respondent D, pers. com., 2011). “Biodiversity stewardship can be the answer to conservation implementation in South Africa” (Respondent M, pers. com., 2011). Awareness of biodiversity stewardship as a successful programme for implementing conservation should be better achieved (Respondent D, pers. com., 2011).

Biodiversity stewardship has scope and potential to be used as a marketing tool for products produced on the biodiversity stewardship sites, products such as wine can be marketed or branded accordingly (Respondent D, pers. com., 2011). In the Western Cape this has been well achieved (Respondent D, pers. com., 2011) where some wine farms use stewardship in the marketing of their wine to environmentally conscious consumers (Respondent D, pers. com., 2011). Branding biodiversity stewardship creates better awareness (Respondent E, pers. com., 2011). The Dalton Nature Reserve in KwaZulu-Natal has recorded positive spin-offs in terms of receiving guest bookings based on the marketing of their lodge’s participation in the biodiversity stewardship programme (Respondent M, pers. com., 2011).

Biodiversity stewardship is based on a hierarchical process that enables landowners to enter into biodiversity stewardship at the entry level and move up to higher categories as they feel more comfortable. The hierarchical process of biodiversity stewardship encourages people to strive to do better in terms of conservation (Respondent A, pers. com., 2011). The flexibility of biodiversity stewardship is what makes it

so unique. Its flexibility encourages future landowners and/or managers to enter into whichever agreement they feel comfortable with (Respondent H, pers. com., 2011).

Regardless of their choice of category, entering into the biodiversity stewardship programme means landowners are wilfully entering the conservation sector (Respondent A, pers. com., 2011). The standards of biodiversity stewardship are often higher than other protected areas, as the site selection process is rigorous and the management plans are comprehensive (Respondent A, pers. com., 2011). Biodiversity stewardship allows for various levels of protection, and many activities on the land can still proceed, this is a viable option for many landowners (Respondent A, pers. com., 2011).

Sharing of success stories and shortfalls of the biodiversity stewardship programme with the public will create a better understanding and awareness (Respondent D, pers. com., 2011). These stories could be discussed at farmers' association meetings and agricultural shows could have stands explaining and describing biodiversity stewardship (Respondent D, pers. com., 2011). An understanding of the experiences enables future landowners and/or managers to make well-informed decisions pertaining to their own land (Respondent A, pers. com., 2011). Additional public awareness about biodiversity stewardship encourages more landowners to enter into the process (Respondent E, pers. com., 2011). A landowner better informed about the process of biodiversity stewardship is likely to have a better understanding.

A concern raised by stakeholders during the management stage of was the lack of awareness and recognition of their proclaimed biodiversity stewardship site (Respondent M, pers. com., 2011). It was suggested that there should be a structure where the biodiversity stewardship site landowners can feel more included such as being apart of an organisation or support group (Respondent L, pers. com., 2011). Site visits and meetings could be organised whereby there is a sharing of knowledge amongst the committed landowners (Respondent L, pers. com., 2011). This would give other landowners an opportunity to see what is been done at other sites and learn from other experiences and share their own experiences (Respondent L, pers. com., 2011).

Table 6-6: Overview of raising awareness as an opportunity during site selection and proclamation and management

Opportunities	Site selection and proclamation	Site management
Raising awareness:	<u>Primary mechanism for PAES:</u> -biodiversity stewardship is a main mechanism for protected area expansion <u>Recognition:</u> - successful programme for conservation implementation. <u>Useful as marketing tool:</u> -branding, marketing products and services	<u>Awareness and recognition:</u> -Inclusion in organisation needs to better achieved; -site visits and meetings for sharing of knowledge.

	<p><u>Flexibility:</u></p> <ul style="list-style-type: none"> -Based on hierarchical process; -Encourages future landowners and/or managers to enter into agreement they feel comfortable. <p><u>Sharing of success stories:</u></p> <ul style="list-style-type: none"> -Creates better understanding and awareness; -discussions could take place at agricultural shows or farmer association meetings
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Discussion

Biodiversity stewardship plays an essential role in the NPAES and the achievement of South Africa’s targets, and it plays a further role in the securing of threatened ecosystems (BSSA, 2009; McCann, 2011). “Biodiversity stewardship can be the answer to conservation implementation in South Africa” (Respondent M, pers. com., 2011).

There should be public recognition of the stewards of the land (Gallo et al., 2009). The recognition and marketing exposure is an incentive for landowners (BSSA, 2009). Biodiversity stewardship has scope and potential to be used as a marketing tool as products produced on the biodiversity stewardship sites can be marketed or branded accordingly (Respondent D, pers. com., 2011). Marketing of products such as wine and lodges using stewardship as a draw card in many cases has been well achieved; this creates better awareness of biodiversity stewardship (Respondent D, pers. com., 2011; Respondent M, pers. com., 2011).

A concerning issue is the lack of awareness and recognition of the proclaimed biodiversity stewardship sites. There should be site visits and meetings, discussions at farmers’ association meetings and stands at agricultural shows to share successes and knowledge and to improve recognition of the biodiversity stewardship sites (Respondent L, pers. com., 2011). This suggestion was reiterated by several stakeholders as it was further suggested that all stewardship landowners should be apart of an organisation to feel more included (Respondent L, pers. com., 2011).

An understanding of the experiences enables future biodiversity stewardship landowners and/or managers to make well-informed decisions pertaining to their own land (Respondent A, pers. com., 2011). This reiterates the research conducted by Rossouw (2012) which identifies the need for a platform for likeminded landowners to engage and interact with each other and conservation officials. This would give other landowners an opportunity to see what has been done at other sites, learn from other experiences, and share their experiences (Respondent L, pers. com., 2011). The intentions to reach such an objective are apparent; however, this has not been well achieved in any of the provinces and there is further scope and potential for it.

Further recognition and understanding of the biodiversity stewardship programme needs to be better achieved, as the potential for private landowners to conserve critical biodiversity is paramount. The hierarchical approach of biodiversity stewardship allows for flexibility and landowners can enter into agreements that feel comfortable to them. Roselands Nature Reserve, BBCONR and Umgano had willing landowners wanting to protect their land for future generations; this is a key aspect to successful conservation. Willing landowners managing ICAs are likely to operate over a long period of time (Gallo et al., 2009). Landowner commitment and willingness strongly influence the success of stakeholder engagement. Cooperative stakeholder engagement and strengthening linkages in biodiversity stewardship are pivotal for successful conservation of biodiversity features. Collaboration of different stakeholders promotes adaptive co-management, as there is learning through feedback, which in effect builds capacity.

6.3.2 Strengthening linkages

For site selection and proclamation, the reoccurring opportunities and strengths pertaining to strengthening linkages include good communication, ascertaining perceptions and backgrounds and strong support from NGOs and EPWP who are instrumental in technical support, site assessments and financial backing (Table 6-7). The opportunities addressed by the stakeholders pertaining to the management of the biodiversity stewardship sites include strengthening linkages between NGOs and EPWP as they play an important role in management and NGOs aid in improving landowner extension (Table 6-7). These perceptions are presented below and then discussed accordingly.

As acknowledged by the stewardship landowners and/or managers, during the site selection and proclamation stage the biodiversity stewardship programme involves multiple stakeholders (Respondent I, pers. com., 2011). “Biodiversity stewardship does not happen in isolation” (Respondent K, pers. com., 2011). The provincial conservation authority, NGOs such as World Wildlife Fund (WWF) and Endangered Wildlife Trust (EWT), the Department of Environment and Agriculture, and landowners all play active roles in the implementation of biodiversity stewardship (Respondent K, pers. com., 2011). Strengthening links between these stakeholders is vital for the biodiversity stewardship programmes success (Respondent K, pers. com., 2011).

“The most important tools for a successful biodiversity stewardship programme is good landowner extension; transparency, open communication, clarity and accountability” (Respondent G, pers. com., 2011).

Furthermore, partnerships, conservation incentives and financial backing provided by NGOs are imperative for successful biodiversity stewardship (Respondent A, pers. com., 2011; Respondent G, pers. com., 2011). Many biodiversity stewardship programmes have strong support by a range of NGOs. NGOs commonly align with the government policies and plans, complementing and aiding with planning. The EWT, WWF, Working for Water (WfW), Working on Fire (WoF) are actively involved in the biodiversity stewardship programme in South Africa (Respondent A, pers. com., 2011). NGOs are responsible for doing a lot of the

groundwork and for securing important biodiversity stewardship sites (Respondent C, pers. com., 2011). They play an active role in site assessments, and CREW, BirdlifeSA, EWT, WWF and Working for Water are vital links in performing successful assessments (Respondent H, pers. com., 2011; Respondent G, pers. com., 2011).

The Bill Barnes Crane and Oribi Nature Reserve and Dalton Private Nature Reserve, both had endangered species working groups play an active role in introducing and promoting the biodiversity stewardship programme to them (Respondent M, pers. com., 2011; Respondent J, pers. com., 2011).

Financial backing for securing biodiversity stewardship sites in KZN by the WWF and the technical support by BirdLife has been very well received (Respondent A, pers. com., 2011). NGOs play an active role in initiating contact between key stakeholders (Respondent F, pers. com., 2011). They undertake many site visits to areas of significant biodiversity and build relationships with landowners. NGOs are seen as neutral and independent, especially if there is mistrust between landowners and governmental departments (Respondent F, pers. com., 2011; Respondent G, pers. com., 2011).

Communication with stakeholders is significantly important for biodiversity stewardship. Through open communication, all limiting aspects of biodiversity stewardship are made known, this gives the stakeholders context and understanding of the downfalls of the biodiversity stewardship programme (Respondent A, pers. com., 2011). If there is mistrust, communicating through credible channels such as through NGOs can be effective (Respondent F, pers. com., 2011).

Understanding the existing knowledge and attitude towards biodiversity stewardship are important aspects to ascertain when communicating with the landowner (Respondent G, pers. com., 2011). Giving presentations at events within the community allows for feedback from key stakeholders (Respondent G, pers. com., 2011). Listening to stakeholders' concerns and addressing them in a positive light aids in improving open communication (Respondent G, pers. com., 2011).

Any scientific and legal aspects of the biodiversity programme need to be explained in non-technical language, this improves communication between the biodiversity stewardship practitioner and the landowners (Respondent A, pers. com., 2011). The landowner can be supplied with the technical report but a summary report with simple language and explanations can be supplied.

During the management stage, strengthening linkages between NGOs is perceived by many stakeholders to be the key to overcoming capacity problems within the biodiversity stewardship programme (Respondent A, pers. com., 2011). The biodiversity stewardship programme is heavily reliant on NGOs, such as EWT and WWF, and EPWP such as WfW in the management of sites. The IAS control for biodiversity stewardship sites is mostly undertaken by NGOs and the EPWP (Respondent A, pers. com., 2011).

The management of the biodiversity stewardship sites requires the participation of multiple parties and actively involving the surrounding community is beneficial (Respondent K, pers. com., 2011). The surrounding communities may include other commercial farmers, subsistence farmers and tribal communities. The Dalton Nature Reserve has been successful in involving the surrounding tribal communities in IAS clearing (Respondent K, pers. com., 2011). Involving the surrounding communities creates a positive outlook on the process and the support given is paramount.

Building trust between landowners and biodiversity stewardship practitioners is favourable (Respondent A., pers. com., 2011). “The most important tool for biodiversity stewardship is good landowner extension” (Respondent A., pers. com., 2011). Better landowner extension will improve the management of the biodiversity stewardship site (Respondent M, pers. com., 2011). There should be an extension officer to follow up and aid in achieving management objectives (Respondent L, pers. com., 2011).

Table 6-7: Overview of strengthening linkages and communication as an opportunity during site selection and proclamation and management

Opportunities	Site selection and proclamation	Site management
Strengthening linkages and communication:	<p><u>Multiple stakeholders:</u> -Provincial conservation authority, landowners and strong support from NGOs and EPWP;</p> <p><u>Communication:</u> -Good communication between all stakeholders, transparency, clarity and accountability. -Listening to concerns addressing them in positive light.</p> <p><u>NGOs role:</u> -ground work. -instrumental in technical support, site assessments and financial backing.</p> <p><u>Ascertaining perceptions and backgrounds:</u> -understanding existing knowledge and attitude of landowners towards stewardship.</p>	<p><u>NGOs and EPWP play an important role in management:</u> -NGOs help in overcoming capacity problems; -IAS control.</p> <p><u>NGOs aid in improving landowner extension:</u> -better extension improves management; -follow up to see if management objectives are being achieved.</p>

Discussion

As highlighted throughout this research, a striking feature of contemporary conservation planning and implementation is its complexity due to differing values and perceptions of diverse groups of stakeholders. Successful conservation initiatives are dependent on the participation of multiple stakeholders including local communities, NGOs, private landowners, local government and special interest groups (Desai, 2010;

Wakelin and Hill, 2005; Biggs et al., 2011). The diversity of the stakeholders causes differing values and perspectives (Biggs et al, 2011). Lack of commitment among stakeholders, internal tensions and conflicting interests of stakeholders are the primary causes for unsuccessful conservation initiatives (Reed, 2008; Pelter et al, 2009). Biodiversity stewardship does not happen in isolation and partners need to be developed. The success of conservation planning and its usefulness for implementation and management of conservation areas is largely dependent on stakeholder partnerships (Knight et al., 2006). Stakeholder collaboration is important for the success of biodiversity stewardship (EKZNW, 2009).

To strengthen partnerships there should be clear and open communication, flexibility, incorporation of multiple sources of knowledge and sharing of ownership (Reed, 2008; Biggs et al., 2011). Similarly, the biodiversity stewardship process is reliant on cooperative governance and key partnerships between conservation agencies, NGOs and landowners (Morris, 2011; BSSA, 2009; MTPA, 2009). Working partnerships, grassroot participation and sharing of knowledge allows for adaptive and flexible co-management (Carlssona and Berks, 2005).

Partnerships, conservation incentives and financial backing provided by NGOs are imperative for successful biodiversity stewardship (Respondent A, pers. com., 2011; Respondent G, pers. com., 2011; BSSA, 2009). Brooks et al. (2006) identify the involvement of NGOs in a multitude of different conservation planning approaches. NGOs play an active role in placing pressure on administrative actions to guarantee that duties of the conservation authority are fulfilled.

NGOs play a pivotal role in the biodiversity stewardship site selection and proclamation process and follow-up management, especially as conservation authorities are overshadowed with a lack of funding and capacity (Respondent A, pers. com., 2011; Respondent G, pers. com., 2011; DEA and SANBI, 2009a). NGOs assist with site assessments, provide expertise in drawing up the management plan and provide support and assistance with the consultation process (Olivier, 2011). Furthermore, NGOs are responsible for some of the funding and specialist studies regarding biodiversity stewardship sites. Financial assistance from NGOs, donor funding, and the pooling of resources in South Africa is becoming more common as most entities have the same common goal (DEA and SANBI, 2009a). For all three case study sites, Custodians of Rare and Endangered Wildlife (CREW) aided in the biodiversity assessments in terms of identifying rare and endangered species and conservation value occurring within and surrounding the properties (Respondent A, pers. com., 2011; Respondent H, pers. com., 2011; Respondent G, pers. com., 2011).

NGOs bring a variety of different skills and tools to conservation and can often be more adaptive and able to focus on priority areas with additional funding (BSSA, 2009). NGOs play an active role in securing biodiversity stewardship sites as was apparent in the case of BBCONR and the Dalton Private Nature Reserve. Both had endangered species working groups, namely Birdlife and WWF, playing a role in introducing and promoting the biodiversity stewardship programme to the landowners (Respondent M, pers. com., 2011; Respondent J, pers. com., 2011). The NGO-landowner relationship in MTPA has been an

important driver in the process, providing a useful link between the landowner and the conservation authority (Morris, 2011).

Another initiative that can aid in filling gaps in conservation biodiversity is the national Expanded Public Works Programme (EPWP) (Kuntonen-van 't Riet, 2007). The EPWP is identified as an employment creating initiative in the various social, economic, environmental and infrastructure sectors (Kuntonen-van 't Riet, 2007). The EPWP that supports the biodiversity stewardship programme includes LandCare, WfW and Working for Fire (WfF). EPWP such as WfW are actively involved in the management of the biodiversity stewardship sites, for example, support was supplied regarding IAS mechanical and chemical clearing on the Roselands Nature Reserve by WfW (Respondent I, pers. com., 2011).

Mechanisms such as biodiversity stewardship will play an increasing role in meeting PA targets, as biodiversity stewardship sites are selected to meet predefined targets and site selection is a meticulous process assessing aspects such as target achievement, spatial considerations and land owner willingness (Respondent A, pers. com., 2011). An approach such as biodiversity stewardship is target specific and based on SCP (Reeves and Marom, 2009). Biodiversity stewardship adheres to many of the strategic objectives set out by the NBSAP as it integrates biodiversity management into the economy. Grassland biodiversity conservation is mainstreamed into beef and dairy farming. Biodiversity stewardship also promotes the sustainable use of biological resources and sharing of the benefits (DEAT, 2006).

Biodiversity stewardship differs from previous ways of selecting PAs as it is based on a site's biodiversity merit and not on political, economic or ownership status (BSSA, 2009; Reeves and Marom, 2009; MTPA, 2009). The site assessments are as accurate as possible and defensible against objections and scrutiny (Morris, 2011). This is further reiterated by Knight et al. (2006) who proclaim that scientifically sound and defensible assessments need to be undertaken in conservation planning, as encroaching land use pressures will have to be defended against (Knight et al., 2006). The site assessments conducted have scientific and ecological support and a concise and credible motivation for proclamation is compiled (Morris, 2011). Site selection is not only based on a meticulous assessment but also on identification of threats and predetermined management objectives (McCann, 2011; Reeves and Marom, 2009).

According to Gallo et al. (2009), Informal Conservation Areas (ICAs) demonstrate willingness and capacity to conserve millions of hectares. As stated, ICAs have no real security, and are not considered in the reaching of PA targets, however, many of these areas may contribute more to biodiversity conservation than a declared PA does (Respondent I, pers. com., 2011). The land in the BMA and CA of the biodiversity stewardship programme are both ICAs. Both the BMA and the CA are selected based on the principle to retain the areas' natural character and they are managed accordingly (Reeves and Marom; Cadman et al., 2010). Arguably, some BMA and CAs areas sustain pristine, intact tracts of land that are managed with consideration to biodiversity; these areas may maintain populations of threatened and endemic species (Respondent E, pers. com., 2011).

The contribution of the BMA and CA sites to conservation is largely dependent on the level of commitment of the landowner to conservation objectives (Respondent I, pers. com., 2011). The Umgano community has signed a thirty-year agreement, with the intention to commit a portion of the land to Nature Reserve status (Bourne, 2011). The Umgano site, despite not formally declared as a PA, still maintains a representative number of threatened and endangered species including the White-winged flufftail (*Sarothrura ayresi*) (CE), Cape Parrot (*Poicephalus artocaeerulea*) (E) and Southern Ground Hornbill (*Bucorvus leadbeateri*) (V) (EKZNW, 2007c). The Umgano site secures significant grassland vegetation types, as the endangered Southern KZN Moist Grassland and the vulnerable Drakensberg Foothill Moist Grassland are placed under conservation management. It also sustains key ecological processes contributing to persistence and conservation of the grassland biome. Managing grasslands to ensure the ecological integrity of the grassland biome is upheld is important for conservation of grasslands (Grasslands Programme, 2010). In terms of NEM: BA, Umgano promotes management and conservation of grassland biodiversity as it aims to maintain the grassland vegetation types in accordance with conservation objectives by promoting better grazing practices and IAS clearing and supports the use of indigenous resources in a sustainable manner (The Republic of South Africa, 2004b).

Biodiversity stewardship sites are managed in such as way to conserve biodiversity and natural processes (BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009; Cadman et al., 2010). Indirect benefits of ICAs such as a BMA may include buffering PAs, and creating contiguity in the landscape (Gallo et al., 2009; Jackelman et al., 2007). Although Umgano is not formally protected, the possibility of forming corridors and linking with the other Nature Reserves is high (EKZNW, 2007c). Umgano can also be a seed resource to surrounding areas, and the forest patches can form part of the migration chain between other forest species (EKZNW, 2007c).

In terms of biodiversity stewardship meeting PA targets, only the Protected Environment and Nature Reserve contribute to formal targets (Respondent M, pers. com., 2011; Dudley et al., 2005). The reaching of targets is usually determined by the amount of area conserved, thus if the areas are declared as a PA, it is assumed to contribute one hundred percent to the target (DEA and SANBI, 2009a; Respondent A, pers. com., 2011). Both the Roselands Nature Reserve and BBCONR are formally declared as Nature Reserves and are committed to biodiversity conservation abiding by stipulations set out in the NEM: PAA (Respondent A, pers. com., 2011; The Republic of South Africa, 2003). Entering into these legally binding contacts is an indication of the commitment of the landowners to conservation (Respondent A, pers. com., 2011; BSSA, 2009; MTPA, 2009; Reeves and Marom, 2009).

Table 6-8: Overview of broad themes of opportunities and potential solutions for site selection, proclamation and management

Opportunities	Site selection and proclamation	Site management
Raising awareness:	Primary mechanism for PAES Recognition as a successful programme Useful as marketing tool Branding Flexibility Sharing of success stories	Awareness and recognition Inclusion in organisation needs to better achieved Sharing of knowledge
Strengthening linkages and communication:	Multiple stakeholders Good communication Strong support from NGOs and EPWP NGOs instrumental in technical support, site assessments and financial backing Ascertaining perceptions and backgrounds	NGOs and EPWP play an important role in management NGOs aid in improving landowner extension

6.4 Conclusion

The complexity and number of key role players involved in biodiversity stewardship gives rise to a number of perspectives. An in-depth understanding of the perspectives of the participants in case study sites has been established. Leadership, representation, capacities, funds, resources, motivation, trust and commitment are the key challenges or obstacles for effective selection, proclamation and management of biodiversity stewardship sites. The opportunities and potential solutions for improvement for effective selection, proclamation and management of biodiversity stewardship sites are raising awareness, strengthening linkages and communication. From the stakeholder perspectives on and attitudes to the challenges and opportunities for the successful implementation of biodiversity stewardship in KZN and in South Africa are described and discussed.

Chapter 7. Conclusion

This chapter revisits the aim and objectives that were outlined in Chapter One. The best possible research methodology was selected to answer the aim and objectives. Recommendations of the research are presented and a conclusion is drawn from the research.

7.1 Revisiting the aim and objectives:

Aim:

Critically assess the potential for the KwaZulu-Natal biodiversity stewardship programme to contribute to towards achieving grassland biome conservation objectives in the province.

The potential for biodiversity stewardship in securing conservation objectives for the grassland biome is notable. As the grassland biome is extensively used and has a number of competing land uses in KZN, a tool such as biodiversity stewardship is a key mechanism for achieving biodiversity conservation of the grassland biome. Biodiversity stewardship promotes better land use management particularly in terms of agricultural practices and provides technical support in achieving sustainable management objectives thus having a positive effect on grassland biodiversity.

The three case studies sites are seen as an effective tool for conservation of pertinent biodiversity in KZN, this is known a priori, which aids in gaining a deeper understanding of the effectiveness of the biodiversity stewardship programme particularly for the grassland biome. All three sites contribute to achieving targets of securing critical biodiversity, and the three sites further secure significant tracts of the grassland biome and forest biome as a habitat for endangered and threatened species.

To implement conservation plans and assessments into sustained on-ground outcomes, biodiversity stewardship requires the participation, interactions and perceptions of multiple stakeholders. Spanning across multiple municipal boundaries and biomes with a number of different stakeholders, stewardship implementation is complex. From the perspectives of key biodiversity stewardship landowners and/or managers a number of obstacles and opportunities were identified, the potential of biodiversity stewardship achieving grassland biome conservation objectives in KZN is dependant on addressing the obstacles and focussing on the opportunities and strengths.

Objectives

- i. Conduct a desktop investigation of the approach, methods and gaps in systematic conservation planning and the status of grassland biomes in South Africa.*

From the considerable volume of literature reviewed, it is evident that South Africa has based conservation planning on SCP, and accordingly national policy, legislation and planning tools are informed by SCP. The conservation plans are generally depicted spatially with the result that a vast array of information is

incorporated into one plan. The plans proactively identify ‘priority areas’ for conservation, and the incorporation of the opportunities such as corridor expansion and constraints such as areas of high transformation, strengthens decision-making. The spatial plans are a product of the mapping of a number of different features and targets. Targets are commonly based on area and surrogacy of species. This information is analysed using specialised software; and the output maps then guide land-use planning in terms of future developments and conservation specifically. South Africa has a number of different tools to inform land-use planning, these include bioregional plans, SDFs and IDP and these frameworks and plans use systematic conservation plans comprehensively.

Conservation focussed on threatened ecosystems and species is valuable. This is specifically true for grassland conservation as the listing of species that are threatened and endangered brings attention to species and ecosystems needing protection. Grasslands with critically endangered species or vegetation types will be of high priority when considering conservation strategies.

In reviewing the literature, it is evident that in South Africa, consolidation of both land-use planning and conservation planning enables the facilitation of the mainstreaming of conservation into production sectors. The mainstreaming of conservation into the agriculture sector is common practice, specifically for the grassland biome. Inclusion of ecological connectivity, natural and intact areas, such as wetlands and riparian zones, and fragmentation avoidance are all principles that complement the mainstreaming of conservation into productive sectors.

In South Africa, specifically KZN, conservation planning is extensive and the identification of pertinent areas in terms of conservation plans is well accomplished. However, the implementation of provincial plans into securing land for conservation is poorly achieved. The NPAES consults spatial planning maps, however, the spatial plans are too broad, use arbitrary units and are based on biased data. Arguably, one of the greatest challenges of SCP is the implementation of the conservation plans into real life situations. Implementation requires that land be secured which adequately reaches the targets outlined by the NSBA and that an adequate management strategy is developed.

The provincial conservation authorities and South African National Parks (SANParks) are actively involved in the NPAES and management of PAs. Despite their active involvement, the lack of financial resources and capacity hinder implementation. As such, mechanisms that aid in achieving cost effective and target-driven land acquisition are needed. Furthermore, the management and sustainable use of resources outside of formal PAs needs to be improved.

To improve conservation of grasslands in South Africa, tools such as bioregional plans, listing of threatened and endangered species, IAS regulation and management plans for ecosystems and species of grasslands should be undertaken. Implementation of conservation areas and monitoring of current grassland conservation areas needs to be better achieved.

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- ii. *Provide an overview of the KwaZulu-Natal biodiversity stewardship programme and attempt to understand the role it plays in grassland biome conservation.*

The potential of the biodiversity stewardship sites are scrutinised during the EKZNW site selection process, and recorded in the BSP documentation. The meticulous assessment process undertaken by EKZNW was not intended to be replicated but rather to be understood in terms of grassland conservation. As presented in this documentation, the Roselands Nature Reserve is important in protecting critical grassland vegetation types. It has a tract of the endangered Midlands Mistbelt Grassland and other vulnerable grassland types are secured. Moreover, the BBCONR contributes to grassland conservation by securing the vulnerable Drakensberg Foothill Moist Grassland. Both the Roselands Nature Reserve and BBCONR secure these grassland vegetation types under formal protection in terms of NEM: PAA initiated through the biodiversity stewardship process. Umgano contains considerable tracts of the vulnerable grassland vegetation types namely the Drakensberg Foothill Moist Grassland and Southern KZN Moist Grassland. Although Umgano does not secure the grasslands under formal protection in terms of NEM: PAA, the management plan outlined by the biodiversity stewardship process aims to maintain the grassland in a pristine state and there is the intention to secure the land under formal protection.

Grassland areas that have threatened and endangered species are important and require conservation due to the endangered species status. The Blue Swallow (*Hirundo atrocaerule*) found at Roselands, the various crane species at BBCONR and the White-winged flufftail (*Sarothrura ayresi*) at Umgano are examples of species of concern and thus the conservation of these areas is significant particularly for grassland biome conservation.

Spatial plans such as the KZN PAES and the current conservation plan are consulted during the biodiversity stewardship site assessments. The consultation of the spatial plans further determines areas of conflicting land uses and consequently they are avoided. Thus, the biodiversity stewardship sites are initially founded on spatial efficiency and conflict avoidance. The conforming of biodiversity stewardship sites to spatial plans should not be the only factor considered. The spatial plans are merely a guide for action and extensive ground truthing is important. This was specifically true for Umgano, as the EKZNW BSP documentation scrutinised Umgano against the 2007 C-Plan and there were no values of high irreplaceability within Umgano.

Additionally, the Roselands Nature Reserve and BBCONR biodiversity stewardship sites are secured under national legislation, specifically the NEM: PAA. Umgano biodiversity stewardship site is secured in terms of contract law. The management of these sites aims to maintain and improve their contribution to critical grassland conservation. The management plans which address issues mainly relating to IAS clearing, grazing practices and burning are outlined in the biodiversity stewardship process and aim to maintain and improve the management of the grasslands.

iii. Review in a GIS environment different KZN conservation plan datasets to verify current and identify potential future biodiversity stewardship site suitability

The Roselands Nature Reserve and the BBCONR are identified as priority areas in both the 2007 C-Plan and the 2010 TSCP, indicating their importance for conservation of critical biodiversity, particularly within the grassland biomes. The spatial operations using the TSCP found that some sections of Umgano did have high irreplaceability and were of conservation significance, contradicting the findings of the 2007 C-Plan.

All three case study sites make an important contribution to grassland conservation in the province. From both the EKZMW BSP documentation and the GIS spatial operations the contribution of the biodiversity stewardship sites to biodiversity representation, persistence and spatial efficiency in the grassland biome is apparent.

The spatial operations conducted in the current research built on from the BSP assessments and verified current biodiversity stewardship case study site suitability to understand the implications of these outputs for meeting grassland biome conservation objectives. To substantiate the findings of the BSP documentation in terms of the case study sites' conservation significance, the occurrence and extent of the TSCP BPAs in each of the case study sites is explored. It was evident that in terms of representation, all three biodiversity stewardship sites adequately represent important biodiversity features, from threatened grassland vegetation types to endangered and threatened faunal species. The persistence of the biodiversity stewardship sites is based on the principle that ecological processes and connectivity are considered. All three case study sites are important due to the ecological processes such as wetlands they incorporate, and thus ensure the persistence of grassland biodiversity.

Transformed areas have an altered natural state; they are deemed unsuitable for biodiversity stewardship. Roselands and BBCONR are surrounded by fragmented areas deemed unsuitable for biodiversity stewardship. The unsuitable land is mainly used for grazing, cropping and forestry and has a detrimental effect on grassland biodiversity. The unsuitable land uses surrounding Umgano are relatively discontinuous and there are vast areas of grassland and bush land uses to the western and north-western side of Umgano.

Areas that avoid threats and vulnerabilities are priority areas for biodiversity conservation. 'Possibly suitable areas' are based on priority areas of the TSCP and areas which are untransformed. There are moderately fragmented areas within close proximity to both Roseland's and BBCONR and there are mostly 'unsuitable areas' for biodiversity stewardship. 'Possibly suitable area' surrounding Umgano is infrequent. Although Umgano has a fair amount of area surrounding it that is untransformed, there are not many TSCP priority areas surrounding Umgano.

The identification of ‘possibly suitable areas’ for biodiversity stewardship is only one aspect of planning. While some ‘possibly suitable areas’ for biodiversity stewardship are evident surrounding the case study sites, the actual selection and implementation of these areas to conservation is multifaceted. The process involves extensive assessments and consultation with various stakeholders. This is evident in the rigorous assessments undertaken by EKZNW to secure the case study sites for biodiversity stewardship. While there is some potential for biodiversity stewardship in the surrounding areas of the case study sites, this potential can only be translated into implementation based on stakeholder involvement.

- iv. Understand the implementation prospects of the biodiversity stewardship programme from the perspective of all the stakeholders involved in stewardship and develop insights into how implementation can be improved.*

The perceptions and attitudes of the stakeholders vary quite substantially. Generally, the biodiversity stewardship process as a mechanism for conservation in KZN and SA has been well received. It is seen as a credible process to secure critical biodiversity areas. As perceived by the biodiversity conservation experts and the stewardship landowners and/or managers the securing of the biodiversity stewardship sites in KZN to date has been very successful. Biodiversity stewardship is a key mechanism for expanding the PA network and placing areas outside of formal protection under conservation management. The consensus of biodiversity conservation experts is that key pieces of national legislation such as NEM: PAA and NEM: BA driving biodiversity stewardship is arguably, why it is so successful.

Despite the success of the biodiversity stewardship programme in KZN, it is important to address the numerous limitations to improve the implementation process. Time constraints relating to the bureaucratic system should be better outlined at the start of the process. The time consuming nature of biodiversity stewardship is out of the control of the conservation authority EKZNW and stakeholders involved. Many stakeholders identified the capacity of the provincial conservation authority to be an area of concern. To address the lack of capacity, it is suggested that the stewardship practitioner takes on fewer sites so that the current sites can be more adequately maintained. Furthermore, additional biodiversity stewardship officers should be employed by EKZNW to address the capacity constraints.

Funding is a limiting factor for the provincial authority EKZNW. Therefore, important partnerships should be further developed between NGOs such as WWF and EPWPs such as WfW. The NGOs and EPWPs can relieve the financial burden of EKZNW in terms of site assessments, development of management plans and maintenance and monitoring the biodiversity sites. NGOs such as CREW are actively involved in the site assessments and EPWPs such as WfW are leading role-players in IAS clearing. NGOs also play an active role in initiating contact between key stakeholders. NGOs undertake many site visits to areas of significant biodiversity and build relationships with landowners. The Bill Barnes Crane and Oribi Nature Reserve and Dalton Private Nature Reserve had endangered species working groups play an active role in introducing and promoting the biodiversity stewardship programme.

The stewardship practitioners realise the importance of building on and strengthening relationships with NGOs and EPWP. Strengthening linkages with NGOs is perceived by many stakeholders to be the key to overcoming capacity problems within the biodiversity stewardship programme. The technical support from NGOs for the biodiversity stewardship programme is vital as it aids in maintaining a positive relationship.

The commitment of the landowner is also important to evaluate. Some stakeholders addressed the issue of land reform and land redistribution, as there is a fear biodiversity stewardship is a form of land expropriation. The legislation is clear that the landowner still has rights to the land even once proclaimed as a Nature Reserve; this should be stressed to the landowners to avoid any confusion and distrust.

In many cases landowner commitment is driven by incentives, but some stakeholders raised concern as conservation should ultimately be the main driving factor not the incentives. Incentives are nonetheless an important aspect of the biodiversity stewardship programme. Management incentives such as IAS clearing, grazing and fire management are seen as more significant for conservation than the fiscal incentives in terms of tax and rates rebates. The stewardship practitioners, the farmers and managers, discussed the importance of a management plan drafted. The management plan for the three case studies mainly involved stocking rates, burning and control of IAS within the grasslands. Although the management plan outlines these key components of grassland conservation, the implementation of these objectives ought to be better accomplished.

Improved support, follow up and extension on grazing, burning and IAS clearing will aid in successful management of the grassland biome. Further stakeholder collaboration particularly with NGOs and the sharing of rights, responsibilities and power will effectively bridge the gap in capacity, which was identified as a major limitation particularly during the management phase of biodiversity stewardship. The strengthening of aspects of management is vital in achieving grassland conservation, as the effectiveness of biodiversity stewardship achieving targets is based on the probability of the management objectives being met.

Management is the most important component of the biodiversity stewardship programme. Although there is some concern over grazing of ungulates within Protected Environments and Nature Reserves, there is substantial research to support the concept that conservation grazing can be practised without causing biodiversity loss. Concern over grazing capacities within the BBCONR was resolved by technical advice through the biodiversity stewardship programme.

Despite the limitations of biodiversity stewardship, it is an appealing programme as areas are selected on their biodiversity merit. The meticulous way of selecting the biodiversity stewardship sites ensure that representation, persistence and key ecological processes are included. Due to this selection process, landowners of the case study sites identified their properties as contributing to targets of conservation as their land has threatened and endangered ecosystems and species and key ecological processes are maintained.

Further developing aspects such as marketing and branding of biodiversity stewardship raises awareness and improves understanding of landowners wishing to enter the programme. Marketing and sharing of success stories of biodiversity stewardship positively influence trust and landowner willingness, this is important for biodiversity stewardship as it addresses the obstacles and risks identified by numerous stakeholders. To further strengthen biodiversity stewardship as a mechanism for conservation, there should be a structure such as a 'working group' where the biodiversity stewardship site landowners can share successes, failures, feel more included, and be apart of an organisation. Organising of site visits and meetings amongst the committed landowners and sharing of experiences will better inform decision making in the future.

7.2 Recommendations and overall conclusion

The current PA network falls short of achieving vegetation targets, species targets and area targets. Although SCP is a guide for action, a limitation of conservation is linking planning more effectively to implementation. South African legislation is well-rounded but implementation is inefficient. A tool that secures land under formal protection, such as biodiversity stewardship needs to be further developed to address poor conservation implementation.

Biodiversity stewardship plays a key role in biodiversity conservation of grasslands in KZN. Portions of privately owned threatened grasslands can enter into formal conservation and be properly managed to contribute to grassland biome conservation objectives. Biodiversity stewardship can also serve as a key mechanism that will secure necessary underrepresented and vulnerable habitats to the formal reserve network. Biodiversity stewardship contributes to conservation largely by maintaining natural areas and ensuring representation and persistence of faunal species and vegetation, as well as maintaining key ecological processes such as dispersal and species migrations.

The support and resources offered to the landowners play a key role in the success of biodiversity stewardship. Given these findings, the strengthening and improved capacity will allow for further expansion of the biodiversity stewardship programme in KZN. This is especially true for the current process of biodiversity stewardship as the capacity of the conservation authorities were found to be wanting. Accordingly, there needs to be increased institutional support from government, conservation authorities and funding agencies.

This research study has further highlighted the success and limitations of biodiversity stewardship as an effective mechanism in securing critical grassland biodiversity. Implementing biodiversity stewardship on private land is vital in securing grassland areas for both formal conservation and conservation outside of the PA network. Biodiversity stewardship is deemed as a necessary process if South Africa is to meet PA expansion and biodiversity targets for increasing the area of land under conservation. Biodiversity stewardship protects and manages critical biodiversity while allowing for coexistence of appropriate land uses. The management of these biodiversity stewardship areas aim to maintain key ecological processes to

support a wide array of species, be spatially efficient and persist for future generations. The stakeholders identified biodiversity stewardship to be vital for biodiversity conservation. The biodiversity stewardship ideology aligns with the legislation and institutional setting and this is important as it has the backing and support. Finally, this research has identified the main shortcomings that need to be addressed to render biodiversity stewardship successful and sustainable in KZN in the future.

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Personal Communication

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Respondent C, 2011. Government Official. 1st June 2011. Wakkerstroom, Mpumalanga.

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Respondent G, 2011. Provincial stewardship conservation expert. 3rd June 2011. Wakkerstroom, Mpumalanga.

Respondent H, 2011. Provincial stewardship conservation expert. 3rd June 2011. Wakkerstroom, Mpumalanga.

Respondent I, 2011. Provincial stewardship conservation expert. 3rd June 2011. Wakkerstroom, Mpumalanga.

Respondent J, 2011. Biodiversity stewardship stakeholder. 31st March 2011. Hilton, KZN.

Respondent K, 2011. Biodiversity stewardship stakeholder. 31st March 2011. Richmond, KZN.

Respondent L, 2011. Biodiversity stewardship stakeholder. 6th June 2011. Pietermaritzburg, KZN.

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Respondent N, 2011. Biodiversity stewardship stakeholder. 8th June 2011. Pietermaritzburg, KZN.

Appendices

Appendix A: Informed consent form signed by all stakeholders

Appendix B: Interview schedule for conservation officials

Appendix C: Interview schedule for stewardship landowners and/or managers

Appendix A: Informed consent signed by all interviewees

Discipline of Geography
School of Environmental Sciences
Faculty of Science and Agriculture
University of UKZN,
Pietermaritzburg
June 2011

Dear Sir/Madam

INFORMED CONSENT FORM

My name is Angela de Jong and I am currently reading for my Masters Degree in Geography and Environmental Management at the University of KwaZulu-Natal, Pietermaritzburg. For my Masters dissertation, I will be conducting research on “The systematic conservation planning of grassland biomes in KwaZulu-Natal: evaluating the stewardship approach”

For this research I will be conducting a series of semi-structured interviews with specialists in the conservation field, as well as with government officials, landowners and officers from Ezemvelo KZN Wildlife. This semi-structured interview forms part of my data collection and will be incorporated into my final project.

Participation in the interview is voluntary and you are free to withdraw from the research at any time without negative or undesirable consequences to yourself. Your response will be treated in a confidential manner, and limits on confidentiality will be set by yourself. Anonymity is assured if you are uncomfortable with the use of your name.

Thank you very much for your co-operation. Please feel free to contact me or my supervisor Mrs Dayle Trotter Richardson, at any time you should have queries in this regard.

Kind Regards

Angela de Jong
Masters Student

Dayle Trotter Richardson
Supervisor

Please complete and sign

I, _____ (full name) agree to be interviewed. I understand all associated conditions as outlined by the above letter and I am Happy to engage in the interviewing procedure. I would/would not like to remain anonymous.

Signature of Interviewee

Date

Appendix B: Interview schedule for conservation officials

General conservation questions

1. What is biodiversity's importance?
2. What is the value of biodiversity for conservation?
3. Why conserve biodiversity?
4. What is the state of biodiversity in South Africa?
5. What is the current management practice of biodiversity within the Protected Areas?
6. How effective is systematic biodiversity planning in South Africa?
7. What is the role of protected areas in contributing to systematic conservation planning?
8. How important and effective are informal reserves in achieving biodiversity conservation?
9. What is the future of South African conservation?
10. What needs to be done to improve conservation efforts?

Biodiversity stewardship questions

1. What other ways are there to secure biodiversity under conservation outside of formal protection?
2. Does biodiversity stewardship align itself with systematic conservation planning, how so?
3. Does biodiversity stewardship contribute to overall conservation targets?
4. How effective is the biodiversity stewardship programme?
5. How do the incentives offered influence the biodiversity stewardship process?
6. How can biodiversity stewardship be used in grassland conservation?
7. What are some of the limitations of biodiversity stewardship?
8. What management practices are put in place?
9. What are the roles and responsibilities of the stakeholders involved?
10. Do the various stakeholders involved have a positive attitude towards biodiversity stewardship?

Appendix C: Interview schedule for stewardship landowners and/or managers

General background questions

1. Has the property always had a conservation minded approach?
2. How did you hear about the biodiversity stewardship programme?
3. When did the process begin, and when was it made official i.e declared?
4. What were the reasons for entering into the biodiversity stewardship process?
5. What apprehension if any were there for entering into the biodiversity stewardship programme?

Biodiversity stewardship questions

1. Does biodiversity stewardship contribute to overall conservation targets?
2. What key features does the property contribute?
3. How effective is the biodiversity stewardship programme?
4. How do the incentives offered influence the biodiversity stewardship process?
5. How can biodiversity stewardship be used in grassland conservation?
6. What are some of the limitations of biodiversity stewardship?
7. What management practices are put in place?
8. What are the roles and responsibilities of the stakeholders involved?
9. Do the various stakeholders involved have a positive attitude towards biodiversity stewardship?
10. What concerns do you have regarding the process?