

Quality of Biodiversity Impact Assessments (BIAs) – experience from the Succulent Karoo Biodiversity Hotspot

T Wentzel



orcid.org/0000-0002-0512-1544

Mini-dissertation submitted in *partial* fulfilment of the requirements for the *Masters* degree in *Environmental Management* at the North-West University

Supervisor: Prof FP Retief

Graduation **May 2018**

24882089



ACKNOWLEDGEMENTS

“The fact is that no species has ever had such wholesale control over everything on earth, living or dead, as we now have. That lays upon us, whether we like it or not, an awesome responsibility. In our hands now lies not only our own future, but that of all other living creatures with whom we share the earth.”

— David Attenborough, *Life on Earth*

I would like to thank my supervisor Professor F.P. Retief for providing me with guidance and motivation while completing this mini-dissertation; his knowledge and advice were invaluable. I am also grateful to all the lecturers who provided endless support and for their efforts in constructing exceptional learning material, interesting classes and presentations throughout the duration of this course.

I would also like to thank my husband, family and friends who stood by me throughout my studies.

ABSTRACT

The Succulent Karoo Biodiversity Hotspot (SKBH) is known for its rich endemism in flora and fauna as well as increasing development pressures and biodiversity loss; this area is therefore considered a biodiversity hotspot. A biodiversity-inclusive Environmental Impact Assessment (EIA) is an important environmental management tool to conserve biodiversity and limit negative impacts within these biodiversity-sensitive areas. This research is aimed at assessing the quality of biodiversity impact assessments (BIAs) within the SKBH using a BIA review package, which was used in similar studies undertaken in the Cape Floristic Region (CFR) and the Maputaland-Pondoland-Albany (MPA) region. The evaluation sample was made up of 16 BIA reports. The results were compared with the CFR and MPA studies as well as international studies in order to identify any emerging trends, weaknesses and strengths within areas of biodiversity value. The results indicated that the reports within the SKBH were of slightly lower quality than the CFR and MPA, and similar trends, in terms of strengths and weaknesses, were noted between the three studies, which are also prevalent internationally. The inadequacies identified during the review were lack of public engagement, lack of inclusion of legal aspects, lack of site-specific and detailed monitoring programmes, and field surveys were often conducted during the incorrect season and over very short time periods. Strengths identified include: application of the ecological approach and precautionary principle, inclusive and clear biodiversity referencing and comprehensive descriptions of the baseline environment. In overcoming the challenges identified, best practice guidelines for the Northern Cape and SKBH should be drafted and implemented for biodiversity inclusive EIAs which has been done in the Western Cape.

Keywords: Biodiversity-inclusive EIA, Biodiversity Impact Assessment (BIA), BIA Review Package, Succulent Karoo Biodiversity Hotspot, Environmental Impact Assessment, EIA Quality Review, Quality Evaluation.

List of abbreviations

BIA	Biodiversity Impact Assessment
Biodiversity	Biological diversity
CFR	Cape Floristic Region
CBD	Convention on Biological Diversity
COP	Conference of the Parties
ECA	Environmental Conservation Act 73 of 1989
EIA	Environmental Impact Assessment
IEM	Integrated Environmental Management
IAIA	International Association for impact Assessment
LCRP	Lee & Colley Review Package
MPA	Maputaland-Pondoland-Albany region
NEMA	National Environmental Management Act 107 of 1998
RSA	Republic of South Africa
SKBH	Succulent Karoo Biodiversity Hotspot
SKEP	Succulent Karoo Ecosystem Programme

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CHAPTER 1 INTRODUCTION

1.1 Problem Statement

Biological diversity (biodiversity), which sustains all life on planet Earth, is under immense pressure and faces many threats (Tyler Miller & Spoolman, 2012:192; UNEP, 2012:139; Steffen *et al.*, 2015). Biodiversity is being lost at a rapid rate and the global community has responded to the need for its conservation. A conservation tool that the Republic of South Africa (RSA) is mandated to implement, in terms of international legislation and national legislation, is the Environmental Impact Assessment (EIA). This humble tool is the basis on which developments are authorised and aims to predict and prevent significant environmental harm and assist with sustainable development. EIAs face certain challenges and therefore academics and practitioners must constantly review this tool and the current best practices to ensure that the goals of sustainability are met (Retief, 2010; Morgan, 2012; Pope *et al.*, 2013; Joseph *et al.*, 2015).

The review of EIAs is performed by taking a sample of reports and assessing each report by using a quality review package that has been adapted in accordance with applicable legislation, guidelines and international best practices to formulate criteria against which the reports are reviewed. The performance of the reports is scored in accordance with the review package and strengths and weaknesses may be identified.

The significance of biodiversity as a crucial constituent to EIAs has been recognised and is becoming more prominent as pressures on biodiversity increase (Wegner *et al.*, 2005:143). Biodiversity impact assessment (BIA) is an important element of the EIA process, even more so in biodiversity-sensitive areas. BIA is the incorporation of biodiversity into an EIA. The BIA assesses the proposed project's impacts on biodiversity (Atkinson, 2000:270).

A good quality BIA has the ability to detect and predict biodiversity losses and impacts, as well as providing for proper mitigation in addressing the biodiversity impacts in a comprehensive manner. The BIA should lay a scientific basis in terms of biodiversity, specifically when decisions are made for proposed developments and projects that may have detrimental impacts on the environment, especially in sensitive areas like biodiversity hotspots (Bagri & Vorhies, 1997:19).

Biodiversity hotspots (areas with high endemism that are under pressure) such as the Succulent Karoo Biodiversity Hotspot (SKBH) should especially be subject to BIAs that fulfil the mandated purpose of the BIA as described above (Gontier *et al.*, 2006; Sloomweg, 2009). BIAs can be seen as a tool that can contribute to conserving biodiversity in the SKBH. The biodiversity found

in the SKBH is of global importance (Mucina *et al.*, 2006), therefore BIAs performed for developments in this area should be of good quality by adhering to guidelines, legislation and international best practices. Research on the quality of BIAs has been undertaken for the Cape Floristic Region (CFR) (Hallat *et al.*, 2015) as well as the Maputaland-Pondoland-Albany (MPA) Biodiversity Hotspot (Swanepoel, 2016). The CFR and MPA studies identified certain weaknesses, strengths and trends, which were compared to international trends in order to determine the prevalence of such trends within areas of high biodiversity value in RSA. To date, the quality of BIAs in the SKBH has not been evaluated; this research aims to assess the quality of the BIAs conducted within the SKBH and compare the results with international studies and the studies completed in the CFR and MPA. This research will contribute to the existing body of knowledge on BIA report quality in biodiversity-sensitive areas within RSA.

1.2 Research Aim

The aim of this mini-dissertation is to evaluate the quality of BIAs in the SKBH (an area with high biodiversity value) and to assess the biodiversity specialist contribution towards EIA reports and the degree to which local and international trends concerning biodiversity input are prevalent in the SKBH will be examined.

1.3 Research Objectives

In order to achieve the above research aim, the following research objectives have been identified:

- i. Investigate applicable national and international literature relating to the mandate and requirements pertaining to BIAs and to determine possible trends relating to the quality of BIA input into EIAs.
- ii. Perform a quality review of a sample of BIA reports from the Succulent Karoo Biodiversity Hotspot using the Biodiversity Review Package as designed by Hallat (Hallat, 2014; Hallat *et al.*, 2015). This will be based on the Lee & Colley Review Package methodology and Trevor Hallat's BIA Review Package for the Western Cape Floristic Region (Lee *et al.*, 1999; Hallat, 2014; Hallat *et al.*, 2015).
- iii. Perform an analysis on the review results to establish common trends and challenges and compare the results with international and local quality trends in similar studies based on the CFR and MPA biodiversity hotspots. Results will be presented in tables and discussed under the relevant criteria headings.
- iv. Provide conclusions and recommendations where appropriate.

1.4 Format and structure of mini-dissertation

This mini-dissertation is drafted in accordance with the style requirements as prescribed by North-West University for master's mini-dissertations in environmental management. The structure and chapters of this mini-dissertation are based on the research objectives as set out above.

The chapter outline of this mini-dissertation is as follows:

- i. **Chapter 1: Introduction.** This chapter provides an introduction and a problem statement to this research. The need for and contribution of this research is presented.
- ii. **Chapter 2: Literature Review.** This chapter provides an overview of the key literature applicable to the importance of EIAs and its mandating legislation on a global and local front. The importance and value of biodiversity globally and within the SKBH is explained. The biodiversity specialist contribution to EIA is outlined and the supporting legislations and guidelines are discussed with a view to understanding the quality assessment of BIAs. International and local trends and challenges in the biodiversity specialist contribution to EIAs are presented by discussing similar studies.
- iii. **Chapter 3: Research Methodology.** The sample selection for the BIAs, research methodology and methods of analysis are addressed. The use of review packages such as the Lee & Colley method along with the research undertaken by Hallat, which is based on the Lee & Colley Review Package for biodiversity contributions to EIAs, is explained (Lee *et al.*, 1999; Hallat, 2014; Hallat *et al.*, 2015). This chapter will explain and present the review package for this mini-dissertation.
- iv. **Chapter 4: Results.** The results of the BIAs are presented in the form of tables and figures and will be fully discussed under the relevant criteria headings. The results will be compared with international and local trends to show common denominators and quality trends.
- v. **Chapter 5: Conclusions and Recommendations.** This chapter provides concluding remarks on the quality of the BIAs within the SKBH with recommendations.

CHAPTER 2 LITERATURE REVIEW

Chapter two discusses literature relevant to the research question, aim and objectives of this mini-dissertation. Firstly literature relating to the origin and purpose of EIAs is presented followed by literature dealing with the importance and value of biodiversity. Literature concerning biodiversity specialist contribution to EIA is explored and lastly literature and research on the review of BIA report quality is discussed with a view to determining possible BIA report quality review trends. The chapter ends with concluding remarks.

2.1 EIA: Origin and purpose

This section commences with an overview of the origin and purpose of EIA and EIA legislation. It places EIA into international context and includes a brief history. RSA EIA legislation development and the evolution over the years are presented to place EIAs into the RSA context followed by a discussion on current RSA EIA legislation. This section explains the legal mandate for EIAs to be undertaken and the purpose of EIAs.

2.1.1 The International context of EIAs

Certain developments will have significant environmental impacts and many countries require that these developments are subject to an environmental impact assessment (EIA) process (Lee *et al.*, 1999:1). The United States introduced the EIA procedure in 1974 by the adoption of the National Environmental Policy Act. This EIA process has been adopted the world over and is well entrenched in many countries' environmental legal framework (Chang *et al.*, 2013:142). According to Aucamp; the purpose of an EIA is the process of systematically identifying alternatives to, as well as potential negative and positive impacts, of proposed developments (2009:5). The EIA results must provide sufficient information in order for government authorities to make an informed decision before commencement of an activity (Sandham *et al.*, 2008:155). The results of the EIA process are communicated in the EIA report. Not only is the report an environmental management tool, these reports also raise environmental awareness, have the ability to protect the environment and give the public a voice by providing access to information regarding development in their communities (Petts, 1999:4). The EIA report can be viewed as the basis on which government authorities make decisions regarding development within their countries. Poor governmental decisions may be made resulting in environmental harm where reports are of an inadequate quality. Having a legal framework that prescribes EIAs and EIA reports is essential, but if the quality of the reports is inadequate the EIA reports become redundant in that the report does not serve its purpose. Chang *et al.*, (2013:142) maintain that "the effectiveness of the EIA depends on the identification and evaluation of baseline data to predict biological, social and physical impacts of a development proposal prior to any

environmental disturbance”. The quality of the scientific EIA process depends on quality EIA reports (Chang *et al.*, 2013:142; Sandham *et al.*, 2008:156).

2.1.2 South African EIA legislation development

EIAs stem from Integrated Environmental Management (IEM), which was provided for in a document published by the Council for Environment in 1989. (Hamann *et al.*, 2000:14; du Pisani & Sandham, 2006:709). IEM was initially concerned with the authorisation of controlled activities. This early version of IEM had a narrow perspective and failed to provide for sustainable development (DEAT, 2004:2).

During the Apartheid era the RSA government did not place environmental concerns at the forefront of its regime priorities. In the 1970s EIAs were only completed on a voluntary basis as a decision aid, hereafter the Environmental Conservation Act (73 of 1989) (ECA) was enacted, which was a step in the right direction for environmental protection in RSA (South Africa, 1989). 1994 saw the dawn of a new era in RSA not only in terms of democracy but also in terms of environmental legislation (Hamann *et al.*, 2000:11). EIAs first became mandatory in 1997 under section 21 of the ECA read with the ECA regulations (Sandham *et al.*, 2008:155; du Pisani & Sandham, 2006:709). During this time period the ECA was the primary piece of environmental legislation in RSA (Kidd, 2011:35).

Under the ECA activities that had significant detrimental effects on the environment could be identified. These activities were subject to EIAs being carried out and would require EIA reports to be compiled (du Pisani & Sandham, 2006:710). The ECA and the IEM principles and procedure came about at the same time and unfortunately the ECA did not incorporate IEM nor was it based on IEM. The ECA was not framework legislation equipped with all the necessary provisions to provide for holistic environmental management in RSA. Recognising the weaknesses in environmental policy and legislation, the new dispensation facilitated a policy process called the Consultative National Environmental Policy Process (Kidd, 2001:35; Hamann *et al.*, 2000:14). This led to the White Paper on Environmental Management Policy for RSA (South Africa, 1997). The White Paper would lay the foundation for further development in RSA environmental legislation such as the National Environmental Management Act (107 of 1998) (NEMA), which deals with IEM in Chapter 5 (South Africa, 1998b).

2.1.3 Current South African EIA legislation

Today the NEMA is the overarching environmental legislation in RSA along with the National Water Act (36 of 1998) (South Africa, 1998a), the Mineral and Petroleum Resources Development Act (49 of 2008) (MPRDA) (South Africa, 2008a) and other environmental sector specific acts (SEMA) that prescribe EIAs.

EIAs are mandated in terms of section 24 Chapter 5 of the NEMA. The minister may publish listing notices that specify activities that may not commence without an environmental authorisation (EA). The most recent EIA regulations and listing notices came into effect on 8 December 2014. The 2014 EIA Regulations consist of the EIA regulations (South Africa, 2014a) which prescribe the EIA process and the three listing notices (South Africa, 2014b; South Africa, 2014c; South Africa, 2014d) which list the activities that trigger a basic assessment (BA) or an EIA. Activities in GN.R 983 -Listing notice 1 requires a BA, activities in GN.R 984 -Listing notice 2 requires scoping and EIA and activities in GN.R 985 -Listing notice 3 requires a basic assessment in terms of sensitive areas.

EIAs are also mandated in the SEMAs and the MPRDA. The National Environmental Management: Air Quality Act (39 of 2004) (NEMAQA) prescribes that an atmospheric emission licence must be obtained for certain listed activities as per section 21 (South Africa, 2004a). Activity 28 of Listing Notice 2 requires that a full scoping and EIA is performed.

The National Environmental Management: Waste Act (59 of 2008) (NEMWA) (South Africa, 2008b) read with GN.R 921 requires that waste management licences must be granted before a waste activity may commence. The notice sets out Category A activities, which require a basic assessment, and Category B activities require the scoping and EIA process in terms of section 24 of the NEMA and the 2014 EIA Regulations (South Africa, 2013; South Africa, 2014a).

The 2014 EIA Regulations prescribe that specialists may be appointed if the level of assessment is of a nature requiring the appointment of a specialist (South Africa, 2014a). This legislation provides for specialist contribution into EIAs including biodiversity specialists. This is relevant in that biodiversity specialists may then be appointed in terms of these regulations for developments that require an EIA and that fall within areas with biological importance or biodiversity hotspots such as the SKBH. The biodiversity specialist compiles the BIA report, which then forms part of the EIA report as one of the appendices. The BIA is considered by authorities in the decision-making process.

2.1.4 Synopsis

The preceding discussion illustrated that EIAs were developed in the USA and are used worldwide as the basis on which decisions regarding projects and developments that may have a detrimental impact on the environment are made. Over the years EIAs have become entrenched in RSA environmental legislation. The EIA legislation in RSA has evolved greatly and EIAs are now prescribed for certain activities under the environmental law framework of RSA. EIAs should result in sound scientific information of good quality in order to facilitate good decision-making. Even though the law prescribes EIAs and what should be included in the EIA

report, this does not always ensure that EIA reports will be of “good” quality. This aspect of quality is discussed in more detail below. International and national legislation requires that biodiversity is protected and provides for a biodiversity specialist contribution in terms of EIAs; the inclusion and the specialist contribution to EIA, specifically relating to biodiversity is explained in greater detail below under section 2.3. The importance and value of biodiversity conservation is first dealt with in order to provide a basis for the biodiversity inclusive EIA legislation in section 2.2 below.

2.2 Biodiversity: Importance and value – Succulent Karoo Biodiversity Hotspot

The definition of biodiversity is provided and the importance of biodiversity must be explored in order to understand the need to conserve it. The importance of biodiversity and the need for the conservation thereof led to the Convention on Biological Diversity (CBD). The CBD recognises the importance of biodiversity for future generations and sets out certain duties for member states in order to preserve biodiversity for many years to come. The following section will look at the current state of biodiversity on a global scale. RSA’s rich biodiversity and current state of biodiversity, and more specifically the SKBH and its value, will be explained.

2.2.1 Why is biodiversity important?

The Convention on Biological Diversity (CBD) defines biodiversity as “*the variability that exists among living organisms from all sources, including inter alia terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part. It includes diversity within species, between species, and of ecosystems*” (CBD, 1992). All species on the planet play a vital role in the earth’s life-support system. The species provide natural resources and services that keep people and other species alive. Without the variety of different species in the life cycle, ecosystems will be disrupted and this in turn would cause further extinctions. Biodiversity is important for sustaining all life forms on earth (Tyler Miller & Spoolman, 2012:192).

Global biodiversity is under pressure. The main international biodiversity threats as per the Global Environmental Outlook Report 5 are habitat loss, climate change, over-exploitation, pollution, and the spread of invasive alien species (UNEP, 2012:139). The rate of mass extinctions at the moment is too rapid for regeneration to take place to replace what is being lost. The planet is losing populations, species and habitats and therefore biodiversity is in sharp decline. The living Planet Index (LPI) measures biodiversity abundance levels by monitoring populations of vertebrate species; the LPI indicated an abundance decline of 58% from 1970 to 2012. Current trends indicate that by 2020 vertebrate populations may decline by an average of 76% compared to 1970. (WWF, 2016:12). The human demand on nature is exceeding the rate

at which the earth can replenish its natural capital (WWF, 2016:32). Many of the global important biodiversity assets are found on the African continent. Africa holds a significant proportion of endemic species and comprises eight of the world's biodiversity hotspots. All the sub-regions within the African continent contribute towards overall global biodiversity. Threats that are specific to biodiversity loss within Africa include: illegal wildlife trade, mono-cropping, air and water pollution, forest loss, climate change, and the increased prevalence in alien and invasive species (UNEP, 2016:77). To curb the global drastic biodiversity loss, countries like RSA, which is rich in biodiversity, must take steps to support the global drive for biodiversity conservation. Life supports life and without biodiversity the life support systems of the earth will collapse (Coetzee, 2015; WWF, 2016:12).

2.2.2 Succulent Karoo Biodiversity Hotspot

Biodiversity is not consistently dispersed across the planet and is often found most densely in areas in developing countries, like RSA (Coetzee, 2015). Southern Africa is one of the world's richest biodiversity regions. RSA is the third most diverse country in the world, with many endemic species; species found nowhere else in the world, which can be attributed to the many biodiversity hotspots (SADC, 2007:2). A biodiversity hotspot is an area that is high in endemic species (flora and fauna), many of which are under immense threat (CI, 2014; Coetzee, 2015). The biodiversity hotspot was defined by ecologist Norman Myers in 1988. Plant diversity is the biological basis and hotspot criteria; a hotspot region must sustain 1 500 endemic plant species, which equates to 0, 5% of the global total and must have lost more than 70% of original habitat (SKEP, 2003). One such hotspot is the Succulent Karoo Biodiversity Hotspot (SKBH). The SKBH is an internationally recognised global biodiversity hotspot, is of global importance, and has been found to be one of the 25 richest and most threatened hotspots on the planet (CEPF, 2005; Mucina *et al.*, 2006).

The SKBH stretches from Namibia over the Northern Cape and includes parts of the Western Cape; this is an uninterrupted area from Lüderitz Namibia, Namaqualand, Hantam, Tanqua, Roggeveld and the Little Karoo (Mucina *et al.*, 2006). The SKBH is approximately 116 000km² with low winter rainfall (CEPF, 2003; CEPF, 2005). The SKBH comprises 63 vegetation units encompassing 6 bioregions: Richtersveld, Namaqualand Hardeveld, Namaqualand Sandveld, Knersvlakte, Rainshadow Valley Karoo and Trans-Escarpment Succulent Karoo (Mucina *et al.*, 2006).

Figure 1 Succulent Karoo Biodiversity Hotspot (Source: CEPF, 2003)



The area is one of only two fully arid biodiversity hotspots in the world and is known for its unique plant life such as succulents and is the only entirely arid region to be recognised as a biodiversity hotspot (SKEP, 2003; Young *et al.*, 2016:16). The SKBH is host to 6 356 different plant species, 40% of which are endemic and 17% are on the Red Data List (BSSA, 2003: 1). The area has the richest variety of succulent plants on the planet and also boasts biodiversity in the form of reptiles and invertebrates (CEPF, 2003:3). The highest local diversity of succulents recorded in the world was in the SKBH, with 29% of plant species in the region while bulbs make up 18%. High endemism in terms of reptiles can be attributed to 36 endemic species from snakes, lizards and tortoises. The region also boasts five endemic frog species, 18 endemic scorpions as well as 24 near-endemic bird species (SKEP, 2003).

The ecosystem services identified within the SKBH, which socio-economic systems are dependent on, include (SANBI, 2009):

- i. Grazing.
- ii. Tourism.
- iii. Water.
- iv. Biodiversity and natural goods.

The unsustainable use of biodiversity within the SKBH can be attributed to certain root causes, many of which are related to a lack of education and awareness of the value and need for biodiversity. These root causes can be summarised as follows (CEPF, 2003; CEPF, 2005):

- i. Lack of awareness of the existence and value of biodiversity;
- ii. Lack of awareness of the market value of biodiversity, except for items such as ostriches and diamonds, that already have commercial value;
- iii. Lack of capacity to undertake conservation actions and inadequate knowledge of possible alternative interventions;
- iv. Lack of alternatives to unsustainable use of biodiversity.

Agriculture and overgrazing are viewed as the harshest pressures on biodiversity within the SKBH. Farming of livestock such as sheep, ostrich, goats and game causes overgrazing in much of the hotspot area. Mining in the northern regions, rivers and along the coast transforms the limited land types and represents a significant pressure within the SKBH. Diamond mining is done through trench excavation and overburden stripping. Riverine flood plains and coastal areas, which are key habitats for biological diversity, are devastated through the mining activities (Mucina *et al.*, 2006; CEPF, 2003; CEPF, 2005). Other pressures include alien and invasive species as well as illegal trading in and harvesting of fauna and flora such as precious succulents, inappropriate tourism development and climate change. Climate change is a major factor as the succulents are particularly sensitive to climate and environmental change particularly if this region becomes drier. The area has also been degraded through mining and agriculture along river corridors (CEPF, 2003; SKEP, 2003:3). Furthermore, the SKBH region can be found in two countries, two provinces as well as different districts and local municipal jurisdictions within RSA, further complicating governmental co-operation to conserve biodiversity (CEPF, 2003).

Responding to the above pressures found within the SKBH, a critical ecosystem programme has been established: the Succulent Karoo Ecosystem Programme (SKEP). Policy and planning documents relevant to the SKEP are discussed in more detail in section 2.3.4.

2.2.3 Synopsis

On a global and local scale, biodiversity is under enormous pressure and something has to be done to decelerate biodiversity decline. Action must be taken as all life is dependent on biodiversity. People require natural resources and ecosystem services such as clean air, water and the nitrogen cycle in order to survive. The major threats to biodiversity on a global, continental and SKBH scale have been identified. As mentioned, RSA is one of the richest countries in the world in terms of biodiversity due to its many endemic species and biodiversity hotspots. The SKBH is a hotspot within RSA that is internationally recognised. The SKBH is under pressure from human activities and threats. From this discussion it is evident that the biodiversity in RSA and the SKBH in particular is unprecedented and must be conserved. Proper biodiversity management and conservation is needed in the SKBH and one of the ways to achieve this is through EIA and the BIAs that form part of the final EIA report.

2.3 The BIA specialist contribution to EIA – legislation, policies and guidelines

The following section will look at international, national and provincial legislation to incorporate biodiversity into EIAs. This section pays attention to international and national guidelines regarding how BIAs should be incorporated. Provincial and local frameworks, plans, programmes and guidelines applicable to the SKBH are set forth. This section provides the legal mandate and policy documents for incorporation of biodiversity into EIA reports. A synopsis is provided to conclude this section.

2.3.1 International guidelines and conventions

RSA is a member state of the CBD. The objectives of the CBD set out in Article 1 are the conservation of biodiversity, the sustainable use of its components, and the equitable sharing of the benefits that derive from the use of genetic resources (CBD, 1992). The CBD requires parties to create national biodiversity inventories, incorporate the protection of biodiversity into policies and programmes, and identify and monitor activities that potentially harm biodiversity. Most importantly, the CBD prescribes that parties must implement biodiversity protection measures such as the formation of protected areas and the promulgation of regulations with incentives designed to promote the sustainable use of biodiversity. The CBD calls for parties to develop national biodiversity strategies and action plans (CBD, 1992; Coetzee, 2015). Article 14 of the CBD provides for impact assessment and minimizing adverse impacts. 14(1)(a) states that parties to the CBD must *“introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate,*

allow for public participation in such procedures” (CBD, 1992). Other international conventions that prescribe that parties must include biodiversity in the EIA process that RSA is a party to include the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971); the Convention on the Conservation Migratory Species of Wild Animals (CMS, 1983) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1963).

There are a number of international guidelines for including biodiversity into EIA. In 2000 the World Bank published the Biodiversity and Environment Assessment Toolkit, which reflected the current best practices in EIA and biodiversity at that time (World Bank, 2000). The 2005 International Association for impact Assessment (IAIA) Best Practice on biodiversity-inclusive EIA served as guidance with the objective of promoting biodiversity-inclusive EIA, assist practitioners to integrate biodiversity into EIAs as well as assisting decision-makers (IAIA, 2005). 2006 saw the publication of the Voluntary Guidelines on biodiversity-inclusive impact assessment. These guidelines stem from a Decision taken at the Conference of the Parties (COP) to the CBD. These guidelines assist parties to include biodiversity into the EIA process (CBD, 2006). The IAIA published the Guidance document on Biodiversity, Impact Assessment and Decision Making in South Africa. This document, published in 2006, aimed *“to integrate biodiversity conservation with impact assessment and develop capacity among stakeholders in developing countries in several regions, including Southern Africa, Central America and Asia”* (Brownlie *et al.*, 2006: i). At the Ramsar Convention COP10 (2008) resolution X.17 produced the Environmental Impact Assessment: updated scientific and technical guidance, which has a specific focus on wetlands. In 2013 the European Commission published guidelines for the integration of climate change and biodiversity in impact assessment (EC, 2013). The most recent international “guidelines” that have been published are the Good Practices for Biodiversity Inclusive Impact Assessment and Management Plan with its companion document the Good Practices for the Collection of Biodiversity Baseline Data. These documents were prepared for the Multilateral Financing Institutions Biodiversity Working Group and published in 2015. The aim of these documents is not to replace formal guidelines but to provide international best practices for biodiversity inclusive EIA as a supplement where biodiversity has not been included. These publications are based on various guidance documents and reports and have synthesized information from non-governmental organisations, multi-lateral finance institutions, government regulators and industry (Hardner *et al.*, 2015; Gullison *et al.*, 2015).

The 2015 Good Practices for Biodiversity Inclusive Impact Assessment document provides a summary on “good practices”. The document recommends that BIAs must be based on a solid foundation that consists of (Hardner *et al.* 2015:4):

- i. Sound biodiversity information and data;

- ii. A good understanding of cumulative impacts; direct and indirect;
- iii. Relevant policy documents must be taken into account like biodiversity strategies and action plans;
- iv. Comprehensive methods to manage impacts.

The 2015 Good Practices for Biodiversity Inclusive Impact Assessment document furthermore provides guidance in terms of BIA focusing on the project alternatives, impact identification, impact characterisation and the assessment of consequence and risk. Lastly the document provides a guidance as to how one should develop a biodiversity management plan with particular reference to the mitigation hierarchy; avoidance, minimisation, rehabilitation/restoration and biodiversity offsets. What is useful about this document is that simple checklists are provided at the end of each section, which can be used to assess whether the BIA samples meet best practices.

2.3.2 National legislation and guidelines

Due to the fact that RSA is a party to the CBD, RSA must take action in terms of article 14 of the convention. In complying with article 14 RSA has enacted legislation and policy documents that incorporate biodiversity into the EIA process.

The 2014 EIA Regulations provide for the appointment of specialists (South Africa, 2014a). Appendix 6 to the regulations sets out requirements regarding the contents of a specialist report. This includes, *inter alia*, the season of the investigation, methodology adopted, buffer areas, mitigation and monitoring requirements. BIAs must therefore also conform to Appendix 6.

Under the CBD, RSA published the National Biodiversity Strategy and Action Plan 2005 and the National Biodiversity Framework in 2009 in terms of section 38(2) of the National Environmental Management: Biodiversity Act (NEMBA) (DEAT, 2005; South Africa, 2004b; South Africa, 2009). The framework recognised the lack of biodiversity consideration in EIAs and recommends ecosystem guidelines for EIAs, generic terms of reference for the inclusion of biodiversity that specifically address issues like ecosystem functioning and cumulative impacts (South Africa, 2009:44). RSA also has provincial guidelines and policy documents that aim to facilitate the inclusion of biodiversity into EIAs.

2.3.3 Provincial legislation, policies, guidelines and planning

Provinces must conserve and take action in terms of biodiversity as prescribed in the NEMBA and must align provincial planning with national strategies like the National Biodiversity Strategy and Action Plan 2005 and the National Biodiversity Framework (Brownlie, 2005:10; DEAT, 2005; South Africa, 2009). This includes the promulgations of provincial legislation as well as

the drafting of policy and planning documents that promote the conservation of biodiversity. These sets of legislation and policy documents must be considered by biodiversity specialists in the conducting of BIAs.

The SKBH is found in Namibia and RSA. In RSA the SKBH is found in the Northern Cape Province and the Western Cape Province.

With regard to the Western Cape the following legislation and policy documents are applicable:

- i. Nature Conservation Ordinance 19 of 1974 (Western Cape, 1974).
- ii. Western Cape Guideline for Involving Biodiversity Specialists in EIA Processes (Brownlie, 2005).
- iii. Western Cape Guideline for the Review of Specialist Input into the EIA Process (Keatimilwe & Ashton, 2005).
- iv. 2014 Western Cape Provincial Spatial Development Framework (Western Cape, 2014).

With regard to the Northern Cape the following legislation and policy documents are applicable:

- i. Northern Cape Nature Conservation Act 9 of 2009 (Northern Cape, 2009).
- ii. Northern Cape Provincial Spatial Development Framework (NCDRDL, 2011).

One will note that there are only guidelines dealing with the incorporation of biodiversity for the Western Cape. There are no specific Northern Cape Guidelines for specialist biodiversity input into EIA. This is unfortunate as the importance and richness of the biodiversity found in the SKBH was discussed above and the Northern Cape Province would benefit from such guidelines.

The Western Cape guidelines for involving biodiversity specialists in EIA processes hope to improve the biodiversity specialist input into EIAs by improving capacity of EIA practitioners in order to produce specialist involvement that is more effective and of a better quality. The guidelines use best practices as well as specialist experience in order to achieve the purpose of these guidelines (Brownlie, 2005). The Western Cape Guideline for the Review of Specialist Input into the EIA Process, published in 2005, has the objective of improving the efficiency, effectiveness and quality of specialist input in EIA. This guideline specifically focuses on timing, scope and quality of the specialist input (Keatimilwe & Ashton, 2005). These guidelines must be read with the other guidelines in the series such as the Guideline for determining the scope of specialist involvement in the EIA process.

Reference must also be had to provincial spatial development frameworks (SDF). In terms of biodiversity, SDFs aim to highlight priority areas (critical biodiversity areas) and aim to achieve

biodiversity conservation targets by rolling out further plans and strategies. The Western Cape has completed a spatial biodiversity plan while the Northern Cape is still in the process of drafting such a document. The Northern Cape Provincial Spatial Development Framework (NCPSDF) of 2011, volume two, addresses key environmental aspects that inform the spatial vision for the province and recognises the richness of the biodiversity found in the SKBH (NCDRDL, 2011:1). The Western Cape Provincial Development Framework also focuses on biodiversity key challenges and aspires to protect the biodiversity found in this province (Western Cape, 2014:40). The provincial SDFs build on information and mapping on biodiversity set out in District and Local Municipal SDFs and biodiversity sector plans. Therefore specialists must take cognisance of all the legislation and policy documents that are applicable to the study area in which the BIA is completed, which encompasses local, district, provincial, national as well as international sources (Brownlie *et al.*, 2005).

2.3.4 Planning and conservation relating to biodiversity in the SKBH – the SKEP

The Succulent Karoo Ecosystem Programme (SKEP), which is a multi-stakeholder bioregional conservation and development programme, was established as a bi-national initiative between RSA and Namibia to address the exacting pressures that the SKBH is under and conserve this invaluable ecosystem (SANBI, 2016).

The SKEP has culminated in ecosystem profiling and research, which has resulted in a technical report, ecosystem plan and 20-year strategy. The following documents are of importance in terms of understanding this ecosystem and the strategic conservation direction that is required for the SKBH:

- i. Ecosystem Profile: The Succulent Karoo Hotspot (CEPF, 2003);
- ii. Succulent Karoo Ecosystem Plan, Biodiversity Component Technical Report (Driver *et al.*, 2003);
- iii. SKEP 20 Year Strategy: Biodiversity and Sustainable Land-use in the Succulent Karoo (SKEP, 2003);
- iv. Succulent Karoo Hotspot Briefing Book (CEPF, 2005).
- v. Succulent Karoo Ecosystem Programme Phase 2: 2009 – 2014 (SKEP, 2008);
- vi. Assessment and Evaluation of Ecosystem Services in the Succulent Karoo Biome (SANBI, 2009).

Headed up by the Critical Ecosystem Partnership fund, which also provided funding, the SKEP has four goals (SKEP, 2003; SKEP, 2008):

- i. To increase local, national and international awareness of biodiversity in the SKBH;
- ii. Expand the protected areas and improve conservation management;

- iii. Support the creation of a matrix of harmonious land uses; and
- iv. Improve institutional co-ordination to generate momentum and focus in terms of partnerships and sustainability.

The SKEP aims to achieve comprehensive action and properly plan for protecting this biological wonder of the world through international and local stakeholders. Having reference to the research, planning and strategic documents discussed above, it is submitted that the SKEP and its strategies and reports should be considered by specialists when BIAs are performed in the SKBH.

2.3.5 Synopsis

The above discussion illustrates that due to the fact that RSA is a member of the CBD, RSA has promulgated national and provincial legislation, and authorities have published policy and planning documents and guidelines that address the incorporation biodiversity into EIAs and provide biodiversity mapping and targets. Internationally, many guidelines have also been published with the hopes of improving BIA quality. The Western Cape has published guidelines for the inclusion of biodiversity in EIAs, while there are no guidelines for the incorporation of biodiversity specifically within the Northern Cape. On the local front the SKEP has funded much research and provided a strategy to assist in conserving biodiversity within the SKBH. When undertaking a BIA in the SKBH, specialists must ensure that all applicable international, provincial and local legislation, policy and planning documents, guidelines and ecosystem strategies are considered in order to determine whether the BIA process and the BIA report comply with the relevant legislation. Furthermore the specialist must ascertain to what extent the proposed project, from a biodiversity perspective, is in conflict or supports these legal instruments, policy documents and guidelines.

2.4 Reviewing BIA quality contribution to EIA

One of the aims of this mini-dissertation is to determine the quality of BIAs in the SKBH. The origin and purpose of EIAs have been discussed above. It was explained that decisions regarding certain developments are based on EIAs and the reports submitted. Certain EIAs, areas with biodiversity sensitivity for example, will require a BIA as a specialist input into the EIA and form part of the report that is submitted to authorities for a decision. What follows hereunder is an explanation as to why EIA and BIA reports should be reviewed in terms of quality. Lastly, one of the leading international methods of report review will be discussed.

2.4.1 Importance of EIA report quality review and the leading method for quality review

Certain themes have been identified in the evolution of EIAs and one of the themes is the quality of EIA reports (Retief, 2010). Fry and Scott (2011:1) state that auditing the documents that are produced in terms of EIA regimes, such as EIA reports, is an effective way to determine the affectivity that the EIA process is being implemented successfully. This would aim to improve report quality (Wood, 1999:12). If the quality of reports is scrutinised it will ensure that reports being submitted are adequate and of “good” quality, it will determine whether the information included in the report is sufficient before a decision is taken, and identify weaknesses and assist with the improvement of report quality (UNEP, 2002). Reviewing reports detects whether the report meets a certain quality criteria, prediction of environmental impacts and where impacts have not been adequately addressed (Phylip-Jones & Fischer, 2013:4; Fry & Scott, 2011:1). Each jurisdiction has its own legal requirements as to the minimum requirements that should be included in an EIA report. What is important is that EIA reports should not only meet minimum legal requirements as to what should be contained in these reports, they should also provide for sustainability and environmental best practices. Internationally, impact assessment can be strengthened through increasing the integration of sustainable development (Morrison-Saunders *et al.*, 2014). Environmental assessments need to address the common goal of sustainable development and sustainable futures and this must be done urgently (Kim & Wolf, 2014:20).

According to Sandham *et al.*, one of the main methodologies used in evaluating the quality of EIA reports is the use of review packages (2008: 702). There are multiple review packages that have been developed over the years. Perhaps the most well-known package is the 1992 Lee & Colley Review Package (LCRP) (Lee *et al.*, 1999; Sandham *et al.*, 2008:156; Chang *et al.*, 2013:143). The use and support of the LCRP for quality review of EIA reports is well documented. There have been many published studies based on the LCRP and adapted versions of the LCRP (Phylip-Jones & Fischer, 2013; Sandham *et al.*, 2008; Sandham, Hoffman *et al.*, 2008; Bonde & Cherp, 2000; Barker & Wood, 1999). The LCRP has been endorsed in that it can be used by different reviewers in different jurisdictions and the approach is simple (Fry & Scott, 2011:1). This research will use the LCRP methodology and the criteria designed by Hallat for the CFR, to assess the quality of the BIA reports in the SKBH (Hallat, 2014; Hallat *et al.*, 2015). This will be explained in more detail in section 2.4.2 below.

2.4.2 Quality review of the biodiversity specialist input into EIAs

Biodiversity specialist contributions form an integral part of EIAs in the hopes of facilitating informed decisions with regard to biodiversity (Bagri *et al.*, 1997; Beanlands & Duinker, 1983; Brownlie, 2005:13; Gontier *et al.*, 2006; Retief 2010; Treweek, 1999). The specialist contribution

aims to assess, mitigate and prevent significant impacts to biodiversity that could possibly be caused by a proposed activity/development (Treweek, 1999). Therefore the quality of the biodiversity specialist contribution is an important element, especially where the area calls for biodiversity input such as the SKBH that has been identified as a biodiversity hotspot. In determining the quality of the BIA input into the EIA report, one may make use of LCRP methodology and then design an adapted review package with specific criteria that assesses report quality, taking area-specific dynamics into consideration.

Hallat has undertaken such research for the Cape Florist Region (CFR) wherein the LCRP methodology was applied. A tailor-made review package for the review of BIAs in the CFR was developed for RSA (Hallat, 2014; Hallat *et al.*, 2015). Hallat used the LCRP methodology and designed a new package in accordance with the specific biodiversity dynamics for the chosen area, RSA legislation and the Western Cape Guidelines (Hallat, 2014; Hallat *et al.*, 2015). The quality of BIAs in the CFR was assessed using the designed review package. A similar study was performed by Swanepoel for the Maputaland-Pondoland-Albany Biodiversity Hotspot (MPA), using the criteria as designed by Hallat to assess the quality of biodiversity reports (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016). This local research has identified trends and challenges in terms of the quality of BIAs in RSA, which is required as indicated above.

2.4.3 Synopsis

EIA and BIA reports should be reviewed as one way of determining whether this environmental management tool is being used effectively. Not only should the minimum legal requirements be met, but the guidelines and international best practices should also be present. One of the leading quality review package put forward is the LCRP for purposes of this research. This method is well recognised on an international level. It has further been explained that LCRP criteria has been modified by Hallat to assess the biodiversity input into EIAs within the CFR and a similar study was undertaken for the MPA (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016). Therefore this research would contribute to the existing body of knowledge on the quality of BIAs in RSA with specific experience in the SKBH.

2.5 BIA contribution to EIA quality: trends and challenges

The section below sets out international and local studies that have focused on the inclusion of biodiversity into EIAs. The international and local challenges and trends found in terms of BIAs in terms of quality are furnished and discussed.

2.5.1 Challenges to biodiversity-inclusive EIAs: International Research

The quality of EIAs has been under constant review as explained above and the inclusion of biodiversity input has also been a topic of research for many years (Bagri & Vorhies, 1997; Wegner *et al.*, 2005; World Bank, 2000). The World Bank undertook an unpublished review of the inclusion of biodiversity into EIAs. This study discovered a number of weaknesses pertaining to BIA reports. Weaknesses included *inter alia*: poor methodology presentation, biodiversity was not included at all when it should have been, poor mitigations plans were provided, general biodiversity information in terms of quality and quantity was weak, and natural variability was unaccounted for (World Bank, 2000). The 1997 World Bank Review of EIAs found some positive improvement in terms of the inclusion of biodiversity, however there was still much room for improvement with regard to: selection of specialist consultants, addressing biodiversity throughout the EIA process, incorporation of variability, consideration of degraded areas and promoting long-term initiatives (World Bank, 1997). Other research found that the objectives of the CBD were not always fully incorporated into EIAs nor were they included into guidelines (Bagri & Vorhies, 1997).

International weaknesses in terms of the BIA contribution to EIAs can be said to include absent biodiversity monitoring plans, studies undertaken during inappropriate seasons, weak connection between baseline studies and impact prediction, neglect of cumulative impacts (direct and indirect), insufficient time periods provided for studies, as well as poor descriptions of the proposed activities (Byron *et al.*, 2000; Söderman, 2005; Thompson *et al.*, 1997; Treweek, 1996; Warnken and Buckley, 1998). Other weaknesses include lack of biodiversity attributes during EIA public participation processes (Söderman, 2006; Thompson *et al.*, 1997); lack of adequately considering alternatives in terms of biodiversity considerations (Söderman, 2006; Treweek, 1996); and lack of considering ecosystem thresholds (Byron *et al.*, 2000; Söderman, 2006; Treweek, 1996; Treweek *et al.*, 1993; Warnken and Buckley, 1998).

Literature on this topic also indicates there are numerous challenges that need to be overcome in terms of the inclusion of biodiversity in EIAs. Research by Wegner *et al.*, (2005) within the Australian context demonstrated that there was a discrepancy as to what was considered in reports, where some reports considered ecosystem diversity while others only considered species diversity, and that a broader definition of biodiversity is required. A further issue was the availability of data and information on biodiversity (Wegner *et al.*, 2005:160). Gontier *et al.*, (2006) found that the inclusion of biodiversity into EIA consists of the following challenges: assessments were vague, lacking in terms of ecosystem assessment and ecological processes; a lack of focus on protected areas species and areas; and a lack of “adequate methodologies for accurate, systematic and quantified predictions of impacts on biodiversity” (2006:269). Gontier *et al.*, undertook to review EIA reports to look at the issue of impact prediction in terms

of biodiversity and reported that the quality of the EIA reports reviewed was poor (road and railway projects in Europe).

Tallis *et al.*, state that many years of research into best practices for mitigation of impacts on biodiversity has not provided a solution to avoiding impacts on critical biodiversity habitats (2015). Cumulative impacts are not taken into account. There is a shift in direction in biodiversity impact mitigation policy documents; the aim is that such policies must be able to account for cumulative impacts in a more comprehensive manner (Tallis *et al.*, 2015). Rosa and Sánchez endeavoured to answer the question as to whether the concept of ecosystem service was improving EIAs. This research found that (a study of five samples) only two EIAs actually contributed towards enhanced EIAs and considered ecosystem services (Rosa & Sánchez, 2015).

2.5.2 Challenges to biodiversity-inclusive EIAs: Local Research

In analysing the above international studies, Hallat found that the international literature on biodiversity input to EIA raised the following shortcomings (Hallat, 2014; Hallat *et al.*, 2015:19):

- i. BIAs are not carried out over a long enough period of time;
- ii. BIAs are conducted over the incorrect seasons;
- iii. Activities that will have a negative impact on biodiversity are inadequately described;
- iv. Life cycle thinking is not provided for proposed projects;
- v. Ecosystem approaches are not applied;
- vi. Ecosystem thresholds (tipping points) are not incorporated;
- vii. Mitigation measures are vague, and
- viii. Inadequate monitoring is prescribed in the EIA reports.

Local research on the quality of biodiversity reports illustrated similar challenges. As explained above, the quality of BIAs has been assessed in two biodiversity hotspots in RSA, the CFR and the MPA (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016). Hallat reviewed a total number of 26 BIA reports for the CFR and made a final conclusion that the above-mentioned shortcomings were present in the sample of BIAs reviewed from the CFR with regard to inadequate monitoring and assessments being undertaken during the incorrect seasons and over insufficient periods of time (Hallat, 2014; Hallat *et al.*, 2015). This research further identified that BIAs are not viewed as an integral part of the EIA process, there is a lack of proper public participation and there is lack of government capacity with regard to technical biological knowledge. Positive aspects identified during the review indicated ecosystem processes are increasingly incorporated when baseline conditions are presented and that the international

precautionary principle is implemented with regard to mitigation measures (Hallat, 2014:52). Swanepoel reviewed a total number of 26 BIA reports using the quality review package designed by Hallat (Hallat, 2014; Hallat *et al.*, 2015). Swanepoel focused on the Maputaland-Pondoland-Albany Biodiversity Hotspot. Swanepoel found that the two areas, the MPA and the CFR, yielded similar results and definite trends were noted in terms of similar strengths and weaknesses (Swanepoel, 2016:43).

This discussion demonstrated that international research found that there are in fact many weaknesses regarding the incorporation of biodiversity into EIAs. In local research similar issues were found to present in the CFR. This mini-dissertation will assess the quality of the BIAs in the SKBH against the criteria designed by Hallat and analyse the results to identify similar weaknesses and trends identified internationally and locally (Hallat, 2014; Hallat *et al.*, 2015).

2.6 Conclusion

The purpose of this literature review was to discuss key literature related to research on the review of the quality of BIAs in the SKBH. Globally, biodiversity is under pressure and tools that may assist in the conservation thereof should be scrutinised. The purpose and importance of EIAs were presented and subsequently the need to review EIAs as well as the input thereto such as biodiversity was demonstrated to be important, especially in biodiversity hotspots such as the SKBH. This literature review presented international and national legislation as well as international and national guidelines and local programmes such as the SKEP that may be used to assess the quality of BIAs in the SKBH. The leading review package, the LCRP, identified as the leading methodology in EIA review, and which was adapted by Hallat, will be made use of for purposes of this mini-dissertation (Hallat, 2014; Hallat *et al.*, 2015). Literature on international and local challenges to the inclusion of biodiversity into EIAs was identified and it was found that similar weaknesses and challenges exist in international BIAs as well as local BIAs.

On reviewing the relevant literature the conclusions set forth below were found. EIAs are one of the main tools used internationally to assess environmental impacts including biodiversity impacts for certain developments that may have detrimental effects on the environment or are proposed to be undertaken in biodiversity-sensitive areas. It is therefore imperative that EIAs and BIAs are of a good quality to ensure biodiversity conservation. Biodiversity conservation has reached new levels of importance on an international scale as biodiversity is being lost at rates faster than it can be regenerated. Therefore BIAs of a poor quality must be identified,

prevented and improved upon especially in biodiversity hotspots. The SKBH was identified as one such area that will benefit from the review of the quality of BIAs. This literature review further found that research on BIA quality in the SKBH has not been completed before and that this mini-dissertation would therefore contribute to the existing body of knowledge on BIA report quality in RSA.

In exploring biodiversity input into EIAs, the legal requirements as well the guidelines, best practices and programmes provide a firm basis as to what and how biodiversity should be incorporated into EIAs. The legal requirements and provincial guidelines can be seen as the minimum requirements while international best practices may serve as a platform to integrate biodiversity more successfully into EIAs within the SKBH. This literature review however found that there are no specific guidelines for the Northern Cape or SKBH pertaining to the inclusion of biodiversity into EIAs.

On studying literature on the incorporation of biodiversity into EIAs many weaknesses and challenges were identified internationally and locally, many of which were similar. Challenges include the exclusion of biodiversity in EIA, poor mitigation plans and methodologies are presented, and biodiversity data is often not available or of a poor quality. Biodiversity is not addressed throughout the EIA process and a lack of consistency exists in that consultants have a different definition of biodiversity; the definition is often not broad enough. Ecosystem assessments and ecological processes are overlooked. Local research furthermore has concurred that many of the international challenges are also present in RSA, especially in terms of EIAs in the CFR and the MPA. The challenges identified were that BIAs are not carried out over a long enough period of time; BIAs are conducted over the incorrect seasons; activities that will have a negative impact on biodiversity are inadequately described; life cycle thinking is not provided for proposed projects; ecosystem thresholds (tipping points) are not incorporated; mitigation measures are vague and inadequate monitoring is prescribed in the EIA reports. This literature review will provide this research with a basis to compare the results of the quality of review of the BIA samples in the SKBH thereby identifying weaknesses and challenges, and recommendations can be made for the improvement of BIAs in the SKBH.

CHAPTER 3 RESEARCH METHODOLOGY

This chapter explains the methodology of the evaluation of the BIAs sampled from the SKBH. The selection of the SKBH as a study area is discussed, followed by the type of BIA reports sampled and how the BIA reports were sourced. The quality review package used to assess the reports is described.

3.1 Selection of the study area: SKBH

The importance and value of biodiversity and more specifically the biodiversity found within the SKBH has been dealt with in detail above in chapter two as part of the literature review to this mini-dissertation. Globally, biodiversity is under pressure and therefore areas that are rich in biodiversity that are under threat should be protected. The SKBH is one such area and is internationally recognised as a biodiversity hotspot (Mucina *et al.*, 2006). The SKBH is known for its variety of succulents, it boasts high endemism in terms of plant species as well as reptiles and invertebrates (CEPF, 2003:3). Unfortunately the SKBH is losing biodiversity at an alarming rate due to human-inflicted pressures and development (SKEP, 2003:3). The SKBH is an area where best practices in terms of biodiversity input into EIAs is definitely required but as indicated above no best practice or Northern Cape guidelines are available for the inclusion of biodiversity into EIAs.

Similar studies have been completed for the CFR and the MPA as explained above and have indicated that there are definite weaknesses in the BIA reports reviewed (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016). Considering the proportion of endemic species and biodiversity value of the SKBH and lack of inclusion of specialist guidelines, it is evident that there is a need to assess the quality of BIA reports within the SKBH. The SKBH was selected as it meets the requirements of a biodiversity hotspot, it falls within RSA and would therefore be subject to the same EIA legislation. The quality of BIA reports in the SKBH has not been subject to research and therefore presented an opportunity to complement the research undertaken by Hallat and Swanepoel (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016).

In terms of the research undertaken by Hallat, it was recommended that further research could be undertaken as a comparative analysis between the quality of BIAs in the CFR and another biodiversity hotspot in RSA (Hallat, 2014; Hallat *et al.*, 2015). The research of Swanepoel (2016) can be seen as further research and a comparative analysis in this regard. This mini-dissertation also serves as further research and comparisons between the results of the studies in the CFR, MPA and the SKBH will be made.

The SKBH can be said to be a good case study for this mini-dissertation as it is rich in biodiversity, the biodiversity is under severe pressures and the research will build onto the research undertaken by Hallat and Swanepoel (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016). Such a case study may contribute towards effective biodiversity management within this significant region.

3.2 Selection of BIA reports

The report sample included a total number of 16 reports across diverse developments as well as biodiversity assessments that fell within the SKBH. Reports were sourced from the internet as well as requested from environmental consultants that have completed EIAs that required a BIA within the SKBH; which were the sample criteria. Some consultants sent BIA reports that were applicable to the incorrect biomes such as the Nama-Karoo or Savannah biome and some consultants sent baseline assessments only or strategic environmental assessments. Therefore not all reports received from consultants could be used as these reports did not meet the sample criteria. An attempt to obtain BIA reports from governmental departments proved most difficult in that a Promotion of Access to Information Application had to be lodged with the Northern Cape Department of Environment and Nature Conservation to obtain BIA reports. The Promotion of Access to Information Act 2 of 2000 gives effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights. Persons requesting information may be required to submit an application in terms of this Act to obtain certain information from governmental departments (South Africa, 2000). It must be noted that BIA reports ought to be in the public domain due to the rigorous public participation requirements in RSA EIA legislation and therefore such an application should *not* have been required in this instance. On granting the application, the relevant department sent basic assessment impact reports as well as EIA reports where no BIA was required. In the hopes of obtaining more BIA reports for the sample the author penned many emails to the department requesting the correct reports be provided but with the time constraints prescribed for the submission of this mini-dissertation the BIA report sample was limited to 16 reports. To date of submitting this mini-dissertation the author had received no BIA reports nor were further emails replied to regarding the Promotion of Access to Information Application.

Furthermore it is difficult to estimate the number of developments and BIAs conducted within the SKBH due to the fact that the governmental department approached does not keep a record of the number of BIAs submitted. The department does not provide a list of EIAs or BIAs that the public can access in order to try and ascertain the amount of EIAs granted or under

consideration, and when the author questioned the governmental department about this telephonically it was apparent that an online database for the record-keeping of EIAs and BIAs and specialist reports was in fact a tool that has been requested by employees but had yet to be provided. There is no database to enable one to determine how many BIAs were submitted within the SKBH. It is therefore challenging to argue that the sample is representative as there is no data available on the amount of BIAs submitted. The studies conducted by Hallat and Swanepoel reviewed 26 reports each within their respective study areas (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016). One could argue that there are likely to be more proposed developments and BIAs conducted with the CFR and the MPA compared to the SKBH due to its arid nature and lack of economic growth in that area. If one examines the statistical growth rate within the Northern Cape compared to the Western Cape and KwaZulu-Natal it is evident that from 2002 until 2013 that out of the 9 provinces the Northern Cape records the lowest average real growth rate. One could therefore assume that a lower amount of environmental authorisations may have been applied for in that area and an even lower amount would have required a biodiversity assessment as not all EIAs require a BIA. The statistics also demonstrate that the distribution of economic activity is relatively low in the Northern Cape compared to the other 9 provinces (Stats SA, 2011; Stats SA, 2014).

The studies conducted by Hallat and Swanepoel applied “Replication Logic” (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016). Replication logic is founded on context-specific logic rather than a statistical representation, meaning that the replication of results can be reasonably expected in a well-defined sample across similar contexts, for example, BIA reports within a defined area (Yin, 2003; Eisenhardt, 2002). Similarly this research relies on replication logic due to the fact that the total number of BIAs conducted in the SKBH is unknown.

The BIA report sample included diverse assessments such as bat, faunal, botanical, ecological, avifaunal, freshwater and marine assessments and included proposed projects such as renewable energy, mining and related infrastructure, power lines and related infrastructure and agriculture. Table 1 below illustrates the BIA report sample.

It is submitted that 16 reports is a valid sample in that the diverse types of developments and biodiversity assessments as well as diverse consultants from which the reports were obtained decreases bias and reinforces the external reviewing validity performed.

Table 1 Sample of BIA reports against types of assessments and developments.

Types and Quantities of BIAs	Types of Biodiversity Assessments covered within the BIAs

Activity	Quantity of BIA Development Reports	Avifaunal	Bats	Botanical	Faunal	Ecological	Freshwater	Marine
Renewable Energy – Wind & Solar	5		1	4	1	1		
Mining and Mining-related infrastructure	7			6	2	1	1	1
Power lines and related infrastructure	2	1		1	1	1		
Infrastructure - Roads	1			1				
Agricultural	1			1				
TOTAL	16	1	1	6	4	3	1	1

3.3 Quality Review Packages

Having selected a biodiversity-rich area and having obtained sample BIAs to assess, the reports must be assessed by a valid methodology. The methodology chosen to review the quality of the sample reports is by means of a quality review package. Quality review packages have formed the basis of much international and local research to determine the quality of EIA reports (Lee *et al.*, 1999; Barker & Jones, 2013; Canelas *et al.*, 2005; Cashmore *et al.*, 2002; McGrath & Bond, 1997; Peterson, 2010; Sandham *et al.*, 2013). Quality review packages such as the LCRP make use of criteria against which EIA or other reports can be evaluated. As explained in the literature review in Chapter 2 above, the LCRP is the most well-known and widely endorsed review package and due to its adaptability in terms of criteria and use in different jurisdictions, its methodology can be used as the basis of research to determine report quality (Hallat, 2014; Hallat *et al.*, 2015; Sandham *et al.*, 2008:156; Chang *et al.*, 2013:143).

Due to the fact that a quality assessment of BIAs had not been performed in RSA, the LCRP methodology was used by Hallat but new criteria were developed in order to evaluate BIAs in the CFR (Hallat, 2014; Hallat *et al.*, 2015). Hallat (Hallat, 2014; Hallat *et al.*, 2015) used the Western Cape Biodiversity-Inclusive EIA Guideline (Brownlie, 2005) and the Specialist Review

Guideline (Keatimilwe & Ashton, 2005) to develop a bespoke review package that is context specific and includes RSA legislative requirements as well as international best practice standards (Hallat, 2014; Hallat *et al.*, 2015). The review package comprises 11 review criteria with each main criterion having sub-criteria that are rated as explained below. The complete BIA review package as designed by Hallat can be found in Annexure A at the end of this mini-dissertation (Hallat, 2014; Hallat *et al.*, 2015). The BIA Review Package was designed for the CFR but it can be argued that the package is based on best practice guidelines and is of a broad scope, which allows for use in other biodiversity-sensitive areas such as the MPA and the SKBH (Swanepoel, 2016:29).

It must however be pointed out that the legislation has been amended since the research conducted by Hallat and this will have reference to the EIA regulations (Hallat, 2014; Hallat *et al.*, 2015). As explained above under section 2.1.3, the current 2014 EIA regulations provide for the inclusion of experts under Appendix 6 to the regulations (South Africa, 2014a). The study by Hallat considered the 2010 EIA Regulations' inclusion of specialists in the EIA process and report in regulation 32 (Hallat, 2014; Hallat *et al.*, 2015; South Africa, 2010). The majority of the reports reviewed in this study were in terms of the 2010 dispensation with only 1 report falling under the 2014 dispensation.

Swanepoel considered the amendments by comparing the specialist inclusion and as per the 2010 EIA regulations and the 2014 EIA regulations (2016:24). The comparison illustrated minor amendments and due to the fact that legal requirements are considered the minimum requirements and the review package was designed to be in line with best practices in terms of the issued guidelines, the legislative amendments effected would not cause the review package as designed by Hallat to be redundant nor would the package have to be amended (Hallat, 2014; Hallat *et al.*, 2015). The table below demonstrates the new additions to the 2014 EIA regulations as taken from the comparison by Swanepoel (2016). These amendments would fall under minimum legal requirements in terms of assessing the report quality.

Table 2 New additions to the inclusion of experts under the 2014 EIA Regulations (Adapted from source: Swanepoel, 2016:26)

New additions to the inclusion of experts under the 2014 EIA Regulations
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;
(f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;
(g) an identification of any areas to be avoided, including buffers;
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including

buffers;
(k) any mitigation measures for inclusion in the EMPr;
(l) any conditions for inclusion in the environmental authorisation;
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
(n) a reasoned opinion- (i) as to whether the proposed activity or portions thereof should be authorised; and (ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

3.4 Assessments of reports against the Review Package

This mini-dissertation will make use of the LCRP methodology and the BIA Review Package as designed by Hallat having reference to the Western Cape Guidelines for involving biodiversity specialists in EIA and the Western Cape Guideline for the Review of Specialist input into the EIA Process discussed above and RSA legislation requirements that prescribe the input of biodiversity into EIA (Hallat, 2014; Hallat *et al.*, 2015). This review package aims to review whether the specialist input meets the minimum requirements as well as international best practices. The review will further determine objectivity and whether the report is professionally sound.

This research will make use of the LCRP qualitative rating scale and hierarchical pyramid. This rating scale uses letters A to F to rate conformance of the BIA report compared to the criteria in the BIA Review Package. Letters are preferred to numerical symbols in order to avoid a mathematical evaluation of reports (Hallat, 2014; Hallat *et al.*, 2015; Lee *et al.*, 1999; Sandham *et al.*, 2008; Hallat *et al.*, 2015). The LCRP assesses the reports in terms of a hierarchical pyramid, which awards symbols to the assessment tiers, resulting in overall report assessment. The 11 criteria set out in the BIA Review Package are rated according to the symbols and in the hierarchical manner depicted below in tables 3 and 4 as well as figure 2 below. The complete Review Package can be found in Annexure A to this mini-dissertation.

Table 3 Abbreviated BIA Report Review Package Assessment Criteria – review areas. (Source: Hallat, 2014; Hallat *et al.*, 2015)

Report Review Package Criteria: 11 Review Areas	
1. Expertise and professional conduct of specialist.	
1.1 Qualifications, expertise and experience	

- 1.2 Details of specialist
- 1.3 Declaration of independence
- 1.4 Validity of information
- 2. Adequacy and sufficiency of information.**
 - 2.1 Information for decision-making purposes
 - 2.2 Terms of reference
 - 2.3 Traditional or indigenous information
 - 2.4 Uncertainties and gaps in information
 - 2.5 Degree of confidence
- 3. Clarity of report.**
 - 3.1 Non-technical summary
 - 3.2 Time and space boundaries
 - 3.3 Sources of information
 - 3.4 Description of specialised methodologies
 - 3.5 Purpose and scope of study
 - 3.6 Justification of opinions or statements
 - 3.7 Adequacy of conclusions
 - 3.8 Summary impact assessment table
 - 3.9 Potential implications of findings
- 4. Description of the project.**
 - 4.1 Purpose and need for project
 - 4.2 Description of project and alternatives
- 5. Description of the baseline environment.**
 - 5.1 Characteristics of affected environment
 - 5.2 Description of surrounding environment
 - 5.3 Maps, plans and photographs
- 6. Consideration of alternatives.**
 - 6.1 Inclusion of reasonable alternatives
 - 6.2 Comparison of alternatives
 - 6.3 Identification of best environmental option
- 7. Inclusion of legal aspects.**
 - 7.1 Description of legal context
 - 7.2 Policy and planning context of project
 - 7.3 Inclusion of standards and guidelines
 - 7.4 Support of policy, plans and programmes
 - 7.5 Likely non-compliance with legislation
- 8. Stakeholder consultation.**

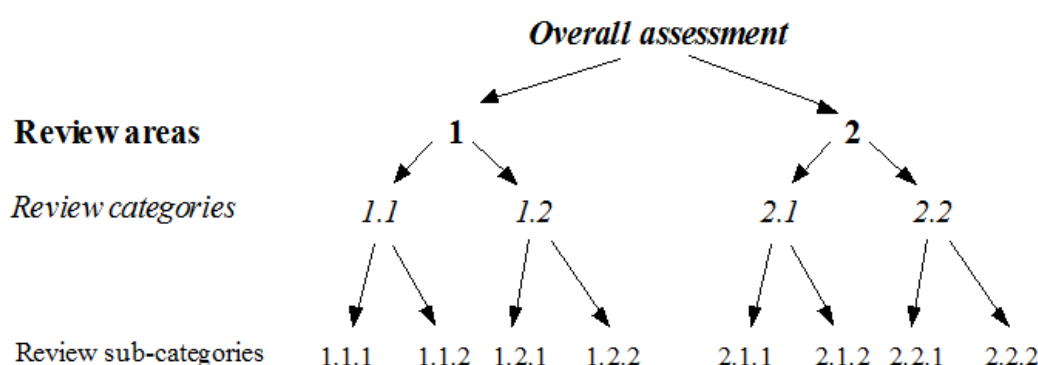
8.1 Description of consultation processes
8.2 Key I&AP input to the EIA process
8.3 Provision for stakeholder involvement
9. Prediction and assessment of impacts.
9.1 Environmental operation scenarios
9.2 Assessment approach and methodology
9.3 Linkages to other specialist studies
9.4 Criteria used to assess impacts
9.5 Impacts on ecological processes
9.6 Indirect or cumulative impacts
9.7 Linkages from identification to evaluation
9.8 Explicitness of consequences
9.9 Irreversibility and irreplaceability of impacts
9.10 Assessment i.t.o. desired state
9.11 Identification of beneficiaries
10. Recommendations for management.
10.1 Summary of key management actions
10.2 Mitigation of positive and negative impacts
10.3 Precautionary principle
10.4 Viability and practicability of mitigation
11. Monitoring.
11.1 Monitoring programmes
11.2 Viability and practicability monitoring

Table 4 BIA Report Review Package Assessment Scale – symbols and corresponding description. (Source: Lee *et al.*, 1999)

SYMBOL	DESCRIPTION
A	Generally well performed, no important tasks left incomplete.
B	Generally satisfactory and complete, only minor omissions and inadequacies.
C	Can be considered just satisfactory, despite omissions and/or inadequacies.
D	Parts are satisfactorily attempted but must, as a whole, be considered just unsatisfactory because of omissions or inadequacies.

E	Not satisfactory, significant omissions or inadequacies.
F	Very unsatisfactory, important task(s) poorly done or not attempted.
N/A	Not applicable. The review topic is not applicable or it is irrelevant in the context of this BIA.

Figure 2 Hierarchical pyramid approach incorporated in BIA review package (Source: Lee *et al.*, 1999).



3.5 Limitations of this study

The methodology has certain limitations in that only one reviewer, the author, has reviewed the sample reports. This evaluation is based on the reviewer's understanding of the review criteria. Only the BIA reports, excluding other appendices, were evaluated but this is considered valid due to the fact that BIA reports should contain all relevant information without the need for the additional EIA reports (Söderman, 2005:89). The author has furthermore explained the manner and attempts to obtain as many BIA reports as possible to conduct this study. It has been argued that although it is difficult to precisely state whether 16 reports is truly representative as the exact amount of BIA reports submitted to the competent authorities over the last several years is not available. However, the results can be deemed to be valid as replication logic has been applied in this study.

3.6 Synopsis

This chapter explains the research methodology used in this mini-dissertation. The selection of the SKBH has been put forward along with argument for the BIA report sample that formed the basis of this study. The types of reports and assessments have been defined and the manner in

which these reports will be assessed, the review criteria, has been explained. Limitations to this study were recorded.

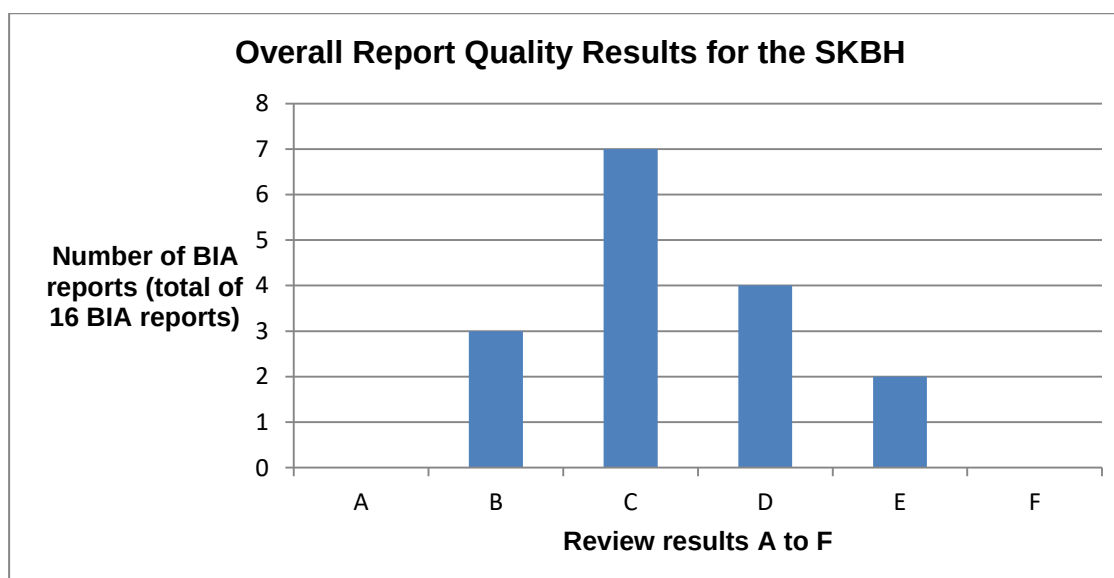
CHAPTER 4 RESULTS

Chapter four discusses the results that were obtained using the BIA Review Package to review the quality of the 16 BIA reports for potential developments within the SKBH. The reports were reviewed according to the methodology used in the preceding chapter. The overall report scores, as well as how the reports fared in terms of the 11 review areas, will be presented and discussed. The results will be compared with the results obtained from similar studies within the CFR and the MPA biodiversity hotspots. Trends found in this study will also be compared to international trends as discussed above in Chapter 2.

4.1 Results of the overall quality of the BIA reports within the SKBH

The analysis of the BIA sample for the SKBH demonstrates that two (12%) of the reports were graded poorly (scoring E-F) and three (19%) of the reports were graded as well done (scoring A-B). The results further indicate that ten (63%) of the reports were graded as satisfactorily completed (scoring A-C), while six (37%) of the reports were graded as unsatisfactory (scoring D-F). Eleven (69%) of the reports were graded as borderline cases, this is where reports are scored as just satisfactory or unsatisfactory (scoring C-D). It was found that the reports most commonly scored a C (just satisfactory with omissions and inadequacies), followed by D (unsatisfactory due to omissions and inadequacies although parts may be satisfactory). These results are depicted in figure 3 below. To gain more insight into the specific trends, weaknesses and strengths of the reports the 11 review areas are discussed individually in the following section.

Figure 3 Bar graph depicting overall BIA report results for the SKBH.



4.2 Results of the 11 review areas

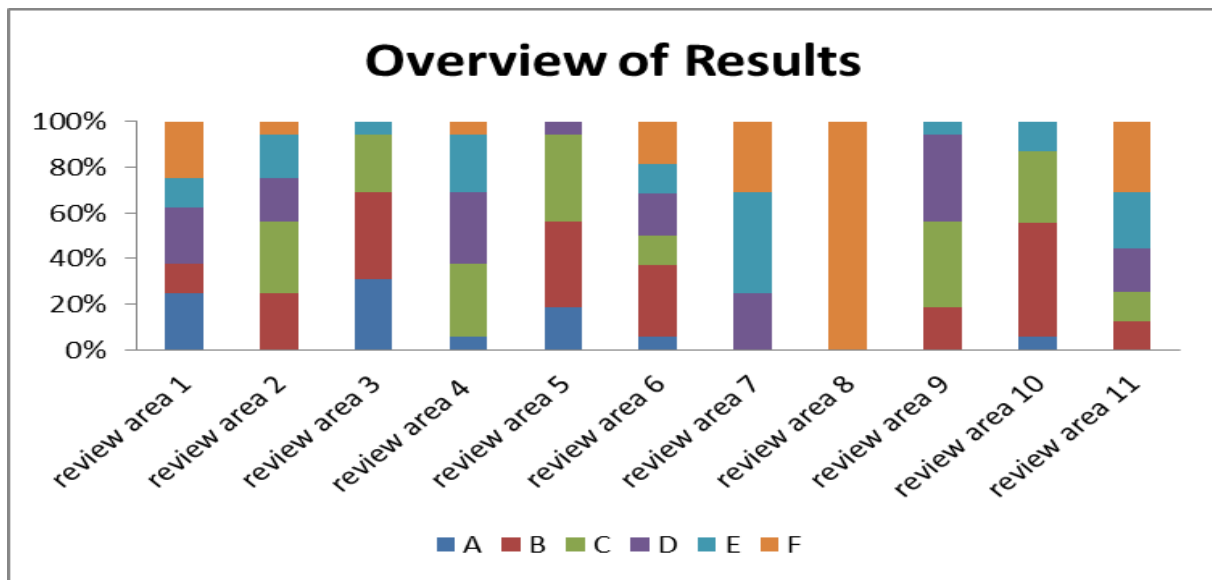
Table 5 demonstrates a summary of the results obtained in assessing the quality of the 16 BIA reports within the SKBH for the 11 review areas in terms of grades A to F (as set out in table 4 above). The table sets out how the reports fared for each review area in terms of percentages and highlights the overall satisfactory grades and unsatisfactory grades in blue. Figure 4 below provides a visual illustration in terms of a bar graph, which enables the reader to see exactly how the 16 reports fared in terms of the 11 review areas. On analysing the scores of the report review sample in terms of the 11 review areas one will note that some of the review areas scored particularly well, such as review area 3 (report clarity), review area 5 (description of the baseline) and review area 10 (recommendations for management). Some of the reports scored poorly for the following areas: review area 7 (inclusion of legal aspects), review area 8 (stakeholder consultation) and review area 11 (monitoring). The results for the 11 review areas are discussed below and trends, weaknesses and strengths are noted to provide insight into the issues in terms of BIA quality within the SKBH.

Table 5 Summary of the review area results reflected in percentages (highlighting overall satisfactory and unsatisfactory percentages in blue).

Summary of Review Area Results		
	Number of reports per symbol score.	Percentage of symbol scores for the sample – 16 BIA reports.

Review area.	A	B	C	D	E	F	% A-B	% A-C Satisfactory	% C-D	% D-E	% E-F	% D-F Unsatisfactory
1. Expertise and professional conduct of specialist.	4	2	0	4	2	4	37	38	25	38	38	62
2. Adequacy and sufficiency of information.	0	4	5	3	3	1	25	56	50	38	25	44
3. Clarity of report.	5	6	4	0	1	0	69	94	25	6	6	6
4. Description of the project.	1	0	5	5	4	1	6	37	62	56	31	63
5. Description of the baseline environment.	3	6	6	1	0	0	56	94	43	6	0	6
6. Consideration of alternatives.	1	5	2	3	2	3	38	50	32	32	32	50
7. Inclusion of legal aspects.	0	0	0	4	7	5	0	0	25	69	75	100
8. Stakeholder consultation.	0	0	0	0	0	16	0	0	0	0	100	100
9. Prediction and assessment of impacts.	0	3	6	6	1	0	19	56	75	43	6	44
10. Recommendations for management.	1	8	5	0	2	0	56	87	31	12	12	13
11. Monitoring	0	2	2	3	4	5	12	25	31	43	56	75

Figure 4 Overview of overall results of the 11 review criteria depicted in bar graph.



4.2.1 Review Area 1: Expertise and professional conduct

This review area indicates that reports generally scored well or poorly and that only 25% of the reports can be defined as borderline cases. The results indicate that 37% of the reports performed adequately (A-C), and 63% of the reports performed inadequately (D-F). Overall the reports fared poorly in this review area. Many of the BIA reports included only the names of the consulting company and/or specialist and failed to provide proper descriptions of expertise in the study area related to the type of assessment qualifications. Furthermore many of the reports failed to provide a declaration of independence and failed to confirm the validity of the information contained in the report.

One will note that the authors have either made a concerted effort to comply with requirements in terms of their expertise and professional conduct or have totally ignored these aspects. Specialists must provide impartial, objective and professional input, which is essential to ethical and good quality reports (Brownlie, 2005:25; Keatimilwe & Ashton, 2005:4; Münster, 2005:24). This is concerning as the declaration of independence is required in terms of the EIA regulations (South Africa, 2010; South Africa, 2014a).

Reports that scored well gave clear descriptions of the relevant specialists' expertise, experience and his/her knowledge pertaining to the field of study for example specific bat-related knowledge for bat impact assessments. These reports enabled the reader to ascertain whether a competent specialist had been appointed for the BIA, unlike the reports that were silent on these aspects. The specialists should have experience in the area (in this case the SKBH) and appropriate formal training in his/her field of expertise and this should be evident in the report (Brownlie, 2005:24).

The results therefore indicate that generally, the BIA reports do not provide the necessary information nor have specialists declared their independence. Due to the fact that many of the reports reviewed in the SKBH did not contain qualifications or experience of the specialists it was not possible to determine whether the specialists had the relevant expertise to conduct the BIAs. The reports within the SKBH could therefore be seen to lack credibility.

4.2.1.1 Review area 1 compared with the results found in the CFR and the MPA

Comparing the results obtained in the SKBH with the results of the CFR and the MPA it is noted that the reports fared rather poorly. It would appear that the reports reviewed the CFR and MPA samples mostly contained the necessary independence declarations as well as comprehensive descriptions of the specialists' qualifications and expertise. The CFR and MPA results were therefore able to demonstrate that most of the specialists had the relevant expertise to conduct the BIAs and that there is considerable knowledge amongst the experts who work within the MPA and CFR (Hallat, 2014; Hallat *et al.*, 2015:43; Swanepoel, 2016:31). Due to the fact that many of the reports reviewed in the SKBH did not contain qualifications or experience of the specialists it was not possible to determine whether the majority of the specialists had the relevant expertise to conduct the BIAs and that there is considerable knowledge amongst the experts who work within the SKBH. The reports within the SKBH could therefore be seen to lack credibility compared to the BIA completed in the CFR and MPA.

4.2.2 Review Area 2: Adequacy and sufficiency of information

Review area 2 did not score very well as only 56% of the reports were graded as adequate (A-C) and 44% of the reports performed inadequately (D-F). 25% of the reports scored well (A-B) and 25% of the reports scored poorly (E-F). This review area further indicates that 50% of the reports were graded as borderline cases (C-D).

It was found that most of the reports included terms of reference but did not include the recommended terms as outlined by Brownlie. The terms of reference examined during the assessment found that often the terms of reference did not identify or respond to scoping issues, establish appropriate time and space boundaries, integrate other specialists, stakeholder engagement and confidentiality issues (2005:25). The BIA report must contain terms of reference to enable the reader to determine whether the objectives of the assessment have been complied with (Keatimilwe & Ashton, 2005:4).

Furthermore many of the reports were based on desktop studies and inadequate time was allowed for field studies and the studies were not conducted during the correct seasons. Where inadequate time is allocated or the study is conducted during the incorrect season this can result in insufficient data and fails to address seasonal biodiversity features, which are an

essential part of addressing biodiversity (Slootweg, 2005; Treweek, 1999). Many of the reports, especially ecological studies and botanical studies stated in the limitations and assumptions sections that there were time constraints, seasonal constraints as well as boundary constraints where not all of the study areas could be visited. One of the reports did not attempt to describe the field visits' time periods nor did it provide any limitations therefore the level of confidence in the findings cannot be assessed. Often the reason for the constraints are not justified or motivated. One can assume that this could be related to financial constraints as well as pressure in terms of development goals, which has a negative impact on achieving biodiversity targets (Bond *et al.*, 2014). Only a very limited number of the sample provided a level confidence in the impact assessment.

None of the reports reviewed addressed or included traditional or indigenous knowledge in the BIA reports, which has been found to enhance BIAs (Barrow, 2006; Sallenave, 1994; Slootweg, 2009; Stevenson, 1996). Only one of the reports attempted to speak to local farm owners.

The results of this review area and analysis indicate that there are serious constraints being placed on BIAs, which could result in poor baseline data and insufficient information for decision-making purposes within the SKBH.

4.2.2.1 Review area 2 compared with the results found in the CFR and the MPA

The MPA resulted in 65% being borderline cases while only 27% of the reports were regarded as well done and 8% performed poorly (Swanepoel, 2016: 32). The CFR study found that 38% of the reports performed well and 68% of the reports were borderline cases and no reports performed poorly (Hallat, 2014; Hallat *et al.*, 2015). It therefore appears that the reports in the CFR were graded as having the best performance followed by the MPA, and the SKBH receiving the lowest grades.

Similarities between the studies indicate that including indigenous knowledge is a major weakness, field studies are of insufficient time periods and during the incorrect seasons. The limitations that consultants provided in the SKBH study area are very similar to the limitations included in the studies performed in the CFR and the MPA (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016:32).

4.2.3 Review Area 3: Clarity and inclusiveness of the report

The report sample reveals that the BIA reports performed well under review area 3. 94% of the reports were graded as satisfactory, 25% were graded as well done, with only 6% of the reports obtaining an inadequate or poor grade.

Only 3 of the 16 reports failed to provide a concise non-technical summary with the majority of the reports providing clear and easy to understand non-technical summaries which will enable decision-makers and interested and affected parties to have a good understanding of the major findings and recommendations of the BIA (Keatimilwe & Ashton, 2005; Morrison-Saunders *et al.*, 2014).

The bulk of the reports included a methodology used for the BIA conducted, consisting of a field visit (although often with time and space constraints) supplemented with desktop studies which used Red Data Lists of South African plant species, IUCN Red List species, SANBI databases, atlases of ecosystems, National Biodiversity Assessments for South Africa and field guides to flora and fauna. What the assessment found is that only a few of the reports (only 3 of the 16 reports) included SKEP sources included under section 2.3.4 of this mini-dissertation.

In general it can be said that the reports contained adequately justified opinions and statements and made findings and implications clear based on strong desktop studies and data.

4.2.3.1 Review area 3 compared with the results found in the CFR and the MPA

The MPA and the CFR also scored well in this area. The MPA results were as follows: 61% were graded satisfactory (C), while 73% of the reports were graded between a B and C and only 27% received a poor grade (Swanepoel, 2016; 32). The CFR found that generally the reports scored well in this area with 54% of the reports graded as well done (A-B) and 46% of the reports being scored as borderline cases and none of the reports were found to have performed poorly (Hallat, 2014; Hallat *et al.*, 2015).

All three studies indicate that specialists do in fact include concise non-technical summaries of the results of the BIA, enhancing environmental decision-making within the 3 areas. Furthermore the results have shown that the CFR, MPA and the SKBH provide proper referencing in biodiversity-inclusive EIAs.

4.2.4 Review Area 4: Description of the project

The BIA reports were graded poorly in this review area mainly as a result of many of the reports not attempting to provide any information whatsoever on the proposed development. Only 37% of the reports received a satisfactory grade while 63% of the reports were inadequate. 6% of the reports performed well while 31% performed poorly. 62% of the reports were borderline cases (C-D). During the assessment of the SKBH reports it was noted that many of the reports only stated what the proposed development was, for example only referring to the “proposed mine area”. The reports frequently did not give any details regarding the project or alternatives. Some of the reports included a brief section on the project and related infrastructure but generally

lacked the required detail. Some of the reports described the routing, access roads and related infrastructure. None of the reports identified whether the project description had changed since the scoping phase, which does sometimes happen.

The reports hardly included all the necessary information recommended by Brownlie (2005:34) and Keatimilwe and Ashton (2005:18) which include: purpose and need of the project, durations, phasing, inputs of raw materials, labour, on-site processes such as noise, emissions, residues and waste throughout project life cycles. These aspects were not discussed in terms of alternatives either. Brownlie further recommends that the specialist should be provided with objectives and description of the project, components, inputs, outputs and the different activities to be conducted during the different phases of the project (2005:34). None of the reports indicated whether this information was in fact provided or not. Where such information is not provided should be identified as a limitation to the BIA.

The results indicate that this review area can be seen as weakness within the SKBH and if the specialist does not receive sufficient information or does not understand the project's activities this may have a negative impact on the specialist being able to predict the impacts of the projects or certain impacts may be overlooked (Slootweg *et al.*, 2006).

4.2.4.1 Review area 4 compared with the results found in the CFR and the MPA

The MPA recorded 77% of the reports were graded as satisfactory (A-C) while 16% of the reports were graded poorly (Swanepoel, 2016:34). The CFR results showed that 31% of the reports were graded as well done in this review area while 65% were borderline cases (C-D) and only 4% performed poorly (Hallat, 2014; Hallat *et al.*, 2015). It is therefore evident that the reports reviewed in the SKBH were graded slightly lower for this review area compared to the CFR and MPA. Both the CFR and MPA studies suggested that due to the fact that the EIA report normally includes a detailed description of the projects, specialists do not deem it necessary to include a full description in the BIA report.

4.2.5 Review Area 5: Description of the baseline environment

This review area scored very well. 56% of the reports were graded as well done and 94% of the reports scored a satisfactory grade. 43% of the reports were borderline cases and only 6% were performed poorly. Most of the specialists provided very comprehensive descriptions of the baseline environment. The reports often included a regional context as well as the project area and sensitive receptors and resources were always made very clear. Clear and accurate maps of the project layout, locality, as well as sensitive biodiversity areas were always provided. It must be kept in mind that the BIAs were often conducted for insufficient time periods and/or during the incorrect season. This will impact on the baseline study but all the reports were

substantiated by rigorous desktop studies and provided proper referencing in biodiversity-inclusive EIA as discussed under review area 3 above. Review area 3 does not address the legitimacy of the baseline conditions as explained by Hallat, who designed the BIA Review Package (Hallat, 2014:47). Furthermore, specialists often used other BIAs that had been conducted within the SKBH to assist with assessing the baseline conditions. The reports tended to not describe the socio-economic environment, anticipated trends and possible future scenarios. This review area could further be improved if key sources under the SKEP are included as discussed above under review area 3 (Brownlie, 2005:36).

Chang *et al.*, (2013:142) maintain that “the effectiveness of the EIA depends on the identification and evaluation of baseline data to predict biological, social and physical impacts of a development proposal prior to any environmental disturbance”. The quality of the scientific EIA process depends on quality EIA reports (Chang *et al.*, 2013:142; Sandham *et al.*, 2008:156).

4.2.5.1 Review area 5 compared with the results found in the CFR and the MPA

The analysis of the results in the CFR found that reports accomplished exceptionally good grades in review area 5. 88% were well done (A-B) and only 12% were recorded as borderline cases (C-D) (Hallat, 2014; Hallat *et al.*, 2015). The MPA study found that review area 5 scored the highest out of all the review areas: 62% of the reports scored an A, 23% scored a B and 15% scored a C. Therefore all the reports were satisfactory (Swanepoel, 2016:35). The results demonstrate that review area 5 could be viewed as a strength in terms of BIAs conducted within the 3 study areas and that specialists generally provide good baseline descriptions within the three biodiversity hotspots. This supports the effectiveness of BIAs in the ability to predict impacts on biodiversity prior to environmental disturbance (Chang *et al.*, 2013:142; Sandham *et al.*, 2008:156).

4.2.6 Review Area 6: Consideration of alternatives

The results of this review indicate that half of the BIA reports were satisfactory, 50% (A-C) while half were unsatisfactory, 50% (D-F). 38% (A-B) were considered as well performed, 32% performed poorly (E-F) and 32% were regarded as borderline cases (C-D). The sample reveals adequate consideration of biodiversity in the evaluation and selection alternatives in only half of the reports reviewed. The reports that did not score satisfactorily during the assessment and generally only considered the “no-go” alternative, which is more of a benchmark and not a true alternative. Furthermore the reports did not look at restoration possibilities when examining the “no-go” alternative.

The most common alternative considered in terms of biodiversity was the routing/areas for the proposed developments in order to avoid biodiversity-sensitive areas. This is positive due to the fact that this will assist in delineating the ecological footprint as well as the cumulative and indirect impacts. Generally these reports recommended the preferred alternative from a biodiversity perspective. The overall weakness pertaining to this review area is the lack of consideration of a wider host of alternatives that include seasons, phasing, scheduling, input and output processes and design alternatives (Brownlie, 2005:28; DEAT, 2004a; Keatimilwe & Ashton, 2005).

4.2.6.1 Review area 6 compared with the results found in the CFR and the MPA

The MPA results showed that 54% of the reports scored an F, 15% of the reports scored an E, 23% of the reports scored a D and 8% of the reports scored a C; therefore 31% of the reports were borderline cases and only 8% of the reports were satisfactory (Swanepoel, 2016:36). The CFR analysis showed that 27% of the reports performed well, 31% performed poorly and 42% were borderline cases (Hallat, 2014; Hallat *et al.*, 2015). In comparing the results it is evident that the MPA performed the weakest and that the CFR and SKBH performed similarly in this review area. None of the sample areas performed particularly well in this review area and improvement is required as alternatives are an essential part of impact assessment (Steinemann, 2001:4). The overall weaknesses found within the SKBH discussed above appear to have been identified within the MPA and CFR.

4.2.7 Review Area 7: Inclusion of legal aspects

Along with review area 8, the inclusion of legal aspects was one of the worst performing review areas. The reports were graded as follows: none of the reports scored as satisfactory (A-C), 25% of the reports were borderline cases (C-D), 100% of the reports were unsatisfactory and 75% of the reports were graded as poor. 8 reports out of the 16 did not attempt to discuss the legal aspects pertaining to BIAs or the project.

Effective BIAs are founded upon, *inter alia*, the identification of biodiversity conservation priorities, which can be found in legislation and policy documents (Hardener *et al.*, 2015). The reports that attempted to include legal aspects often only included national legislation, excluding international, regional, provincial legislation and local by-laws. Many of the reports failed to consider all applicable policy documents in the legal context and were often merely referenced in the baseline section to reference biodiversity-sensitive areas. What was evident was that the applicability of the legislation relating to the BIA, compilation of the BIA, and the proposed project was merely listed and the specialists failed to state how the project may contribute towards the objectives of the policy documents or whether the project was inconsistent with the

applicable legislation and policy documents and guidelines. For example only 7 of the 16 reports referenced a relevant biodiversity sector plan, only 4 reports referred to the Western Cape Biodiversity Specialist Guidelines and only 1 report referred to the Northern Cape Provincial Spatial Development Framework and its importance (Brownlie, 2005; NCDRL, 2011). All of the reports reviewed failed to comment on the level of compliance with the legislation and policy documents. This may indicate the decisions are being taken with a lack of knowledge regarding the proposed project's level of compliance with biodiversity legislation and planning priorities.

4.2.7.1 Review area 7 compared with the results found in the CFR and the MPA

The MPA results demonstrated that 69% of the reports scored satisfactory results (B-C), 8% of the reports were graded as performing well (A), while 4% of the reports were graded as poorly completed (F) (Swanepoel, 2016:37). The CFR results indicated that the majority of the reports performed poorly, 38% (E-F), 58% of the reports were borderline cases (C-D) and only 4% performed well (Hallat, 2014; Hallat *et al.*, 2015). It is therefore apparent that the MPA was graded as performing the best in this area, followed by the CFR. It is furthermore observable that the inclusion of legal aspects is a weakness within all three of the study areas. In comparing the challenges with regard to this review area, throughout the three sample areas the level of detail regarding legal aspects is unsatisfactory; most commonly only national legislation is included.

4.2.8 Review Area 8: Stakeholder engagement

As stated above review areas 7 and 8 were graded as the poorest in the study of the SKBH. All reports scored an F due to none of the reports addressing stakeholder engagement or even attempting to address this important topic. It is therefore evident that the public participation process within BIAs is not a focus area and requires improvement. The reports also failed to mention whether any issues were raised by stakeholders related to biodiversity during the scoping phase (Brownlie, 2005:17). This is an important aspect to address with regard to dependency and use of natural resources and ecosystem services within the study area and that biodiversity is linked to social aspects (De Villiers *et al.*, 2008; Dietz & Stern, 2008; Sloomweg, 2005).

4.2.8.1 Review area 8 compared with the results found in the CFR and the MPA

This review area scored equally poorly in the other study areas. The MPA analysis displays that 62% of the reports were graded F in that there was no mention of stakeholder consultation at all. 23% of the reports were graded E and 15% were graded D. The CFR reports were graded with 77% performing poorly, 8% performing well and 15% of the reports being borderline cases.

The results show the CFR performed slightly better than the MPA and the SKBH was the weakest in this review area. Overall this review area receives little attention in these biodiversity hotspots and perhaps the specialists do not realise the need and value of public participation. These results are in line with international studies.

4.2.9 Review Area 9: Prediction and assessments of impacts

On analysing the results it is noted that 56% of the reports performed satisfactorily (A-C), 75% of the reports were borderline cases (C-D) and 44% of the reports were unsatisfactory. 6% of the reports performed poorly.

The assessment of the reports indicated that many of the specialists incorporated ecological processes into the BIAs, especially habitat fragmentation when considering ecological corridors. Therefore it may be said that the reports reviewed within the SKBH illustrate that biodiversity specialists do indeed take the ecological approach. This may possibly be attributed to some of the reports referring to the Western Cape Guidelines even though most of the projects were in the Northern Cape. As no guidelines have been drafted for the Northern Cape, the Western Cape Guidelines are being made use of for guidance (De Villiers *et al.*, 2005; Brownlie, 2005). 6 of the 16 reports considered the Western Cape Guidelines. Most of the reports provided a clear description of the criteria used to assess the significance of impacts looking at the nature of the impact, probability, confidence, extent and duration and gave a good indication of the consequences of the predicted impacts.

Weaknesses identified during the assessment were: failure to recommend further studies where information or limitations have impaired the assessment, inadequate attention to cumulative impacts, lack of linkages to other specialist input, very few reports included environmental thresholds, “the extent to which the activity can cause irreplaceable loss of biodiversity” and “the degree to which impacts can be reversed”.

A further weakness which is linked to review area 7 is that impacts are not “communicated in terms of the extent to which they support or conflict with the desired future state/vision of the area and sustainable development objectives” whether national, provincial or local.

4.2.9.1 Review area 9 compared with the results found in the CFR and the MPA

The MPA results of impact predictions demonstrated that only 31% of the reports were graded as satisfactory (B-C) while 69% of the reports were graded as unsatisfactory (D-F) (Swanepoel, 2016). The CFR study found that most reports were graded as borderline cases (C-D); 77% were just satisfactory (Hallat, 2014; Hallat *et al.*, 2015). The MPA appears to have been graded the worst for this review area with the SKBH and the CFR scoring similarly with the majority of

the reports being borderline cases. Common weaknesses were identified throughout the 3 study areas: exclusion of environmental thresholds and the exclusion of the reversibility of biodiversity loss and impacts. Swanepoel is of the view that the reports scored poorly in this area can be ascribed to lack of knowledge and understanding of the project which in turn negatively affects the assessment of alternatives (2016:40).

4.2.10 Review Area 10: Recommendations for management

Scrutiny of the SKBH BIA reports show that this review area scored well. 87% of the reports were graded as satisfactory, 31% were borderline cases (C-D) and only 12% performed poorly (E-F). The assessment indicated that the majority of the reports gave comprehensive mitigation measures and a summary was provided that clearly explained the key management actions that would fundamentally affect the significance of impacts on the biodiversity. Where reports lacked information and had limitations, the majority of reports, the specialist employed the precautionary approach as legislated in NEMA (South Africa, 1998b). This is in line with best practices (Treweek, 1999) and the precautionary approach must be implemented where baseline information is lacking (Cooney, 2004; Dickson & Cooney, 2005). The report that performed with an A in this area explained and highlighted the most important mitigation measures, provided site-specific mitigation recommendations, advised on ensuring there is sufficient budget to implement mitigation measures, discussed rehabilitation and the enhancement of positive impacts in great detail coupled with a strong precautionary approach, completely avoiding certain activities in certain areas, and explained whether the mitigation measures were amenable with best practices:

“Placement of turbines and infrastructure in this sensitive area cannot be viewed as a Fatal Flaw, but is not advisable from a botanical perspective and cannot be regarded as complying with the best practice of “avoiding impacts.”

“In order to minimise damage to vegetation, primary construction should ideally be timed to coincide with the dry season dormancy period for the vegetation (November – end to April).”

“Make sure there is sufficient budget to implement all management recommendations noted above.”

Where reports were graded poorly this was due to vague descriptions that were not site-specific (alien and invasive plan without key details and/or descriptions) and did not focus on avoidance, mitigation, restoration, rehabilitation or compensation of negative impacts in a hierarchical fashion. The reports tended to focus on mitigation more than the other management actions. Most reports did not go as far as providing measures for enhancing positive impacts as positive impacts are generally not considered (Brownlie, 2005:45).

4.2.10.1 Review area 10 compared with the results found in the CFR and the MPA

81% of the reports were graded as satisfactory (A-C), while 20% of the reports were graded as unsatisfactory and 12% were graded as poor in the MPA (Swanepoel, 2016:40). The CFR study found that generally this study area was addressed adequately: 27% were borderline cases (C-D) and 69% performed well (A-B) (Hallat, 2014; Hallat *et al.*, 2015). The grades were similar in this review area; all three study areas demonstrated that this review area is generally completed to a satisfactory standard in terms of the review criteria.

Similarities between the weaknesses identified in the three study areas were: not following the hierarchical approach and some reports providing vague mitigation actions in the forms of “management plans” but not providing the exact details in a site-specific manner.

4.2.11 Review Area 11: Monitoring

The review area can be seen as a challenge within the SKBH: 75% of reports were graded as unsatisfactory, 56% were graded as poor, 31% were borderline cases and only 25% were completed as satisfactory. 5 out of the 16 reports did not even mention any form of monitoring (31% scoring an F for no attempt). This is concerning as it is trite that the monitoring of biodiversity is fundamental to BIA (Beanlands and Duinker, 1983; Treweek, 1999). Of the 25% of the reports that were graded as satisfactory very few gave monitoring programmes with detail such as frequency, season and timing for monitoring; responsibility for monitoring, analysis and implementation of responsive management actions; targets and indicators for monitoring; significance thresholds; and auditing and reporting requirements (Brownlie, 2005:50). Only 1 report provided this type of detail for example:

“A botanist familiar with the vegetation of the area should monitor the rehabilitation success on an annual basis in August or September, and make recommendations on how to improve any problem areas. This monitoring need not take more than four days annually.”

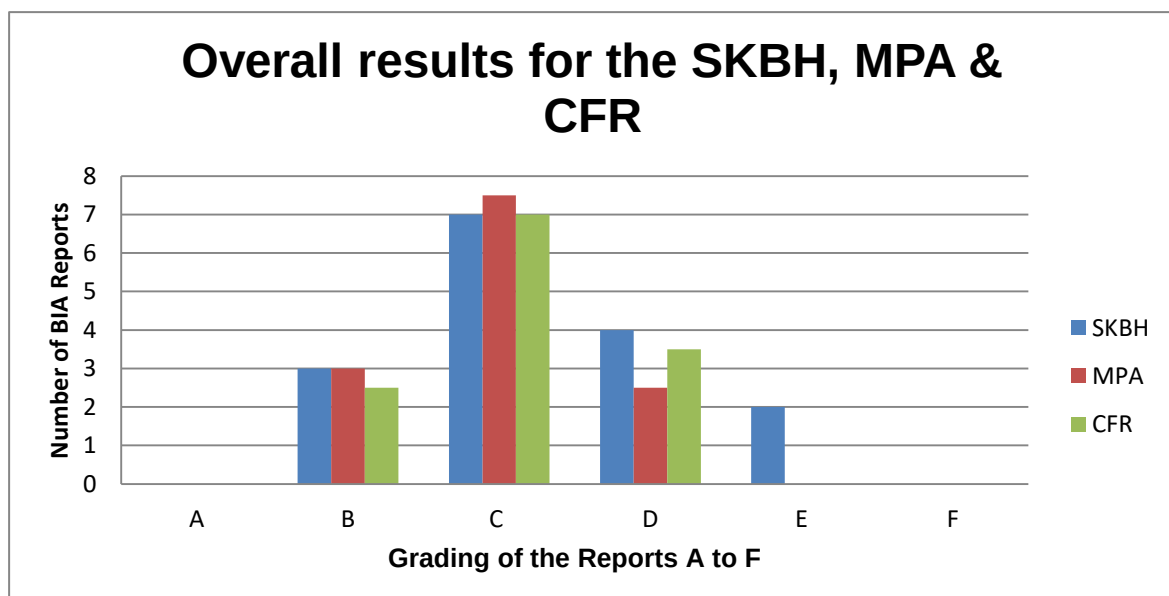
4.2.11.1 Review area 11 compared with the results found in the CFR and the MPA

Results for the MPA demonstrated that 46% performed as just satisfactory (C), 15% were unsatisfactory (D) and 38% were scored as very poor (F). The CFR study area found this review area resulted in poor grades: 34% performed well, 31% were borderline cases and 35% performed poorly (Hallat, 2014; Hallat *et al.*, 2015). All three review areas recorded the results as poor for review area 11. The SKBH could be viewed as faring worse than the other two biodiversity hotspots. A common finding is a total lack of providing any detailed site-specific monitoring of biodiversity across all three biodiversity hotspots.

4.3 Trends in the quality of the BIA reports in the SKBH, CFR, MPA and international studies

Post-analysis of the results obtained in the SKBH compared to the CFR and the MPA, overall the SKBH BIA reports seem to have resulted in slightly lower grades than the reports assessed in the CFR and the MPA. The MPA seems to have achieved slightly better results than the CFR with the SKBH achieving the lowest grades (Swanepoel, 2016:47). Generally the reports performed similarly across the 11 review areas. In terms of the studies conducted in the SKBH, MPA and CFR, some of the samples may have varied slightly in the different review areas but overall there are obvious trends. The results are compared and illustrated in a bar graph below in Figure 5. What follows below is a summary of the trends (strengths and weaknesses) that have been noted within the SKBH compared to MPA, CFR and the international literature discussed in chapter 2 above.

Figure 5 Overall results of the three studies (SKBH, MPA & CFR) areas compared in bar a graph



4.3.1 Trends: Strengths within the SKBH

The following section summarises the strengths found in the SKBH and are discussed in relation to the MPA, CFR and international studies:

- i. **Review area 3:** The inclusion of a non-technical summary of impacts and the implications of the project as well as clear recommendations (Keatimilwe & Ashton, 2005; Morrison-Saunders *et al.*, 2014). Furthermore the results have shown that the CFR, MPA and the SKBH use and provide proper referencing in biodiversity-inclusive EIA which is in contrast to a study undertaken in Israel (Mandelik *et al.*, 2005).
- ii. **Review area 5:** Specialists within the SKBH, MPA and CFR appear to provide comprehensive descriptions of the baseline environment. It must be kept in mind that many of the baseline studies were subject to time and season constraints, which may influence baseline assessment accuracy (Hallat, 2014; Hallat *et al.*, 2015).
- iii. **Review area 9:** Specialists within the SKBH, MPA and CFR appear to take the ecological approach compared to international studies that focused more on lower levels of biodiversity (Byron *et al.*, 2000; Gontier *et al.*, 2006; Rouget *et al.*, 2003; Sloomweg, 2009; Treweek, 1999). Research conducted within the SKBH, MPA and CFR displayed that a trend is emerging in the biodiversity hotspots in RSA where biodiversity specialists are progressively including ecological processes into BIA practice.
- iv. **Review area 10:** Mitigation measures recommended within the SKBH were found to be well presented and comprehensive in the SKBH in contrast to international research in that mitigation measures were too vague (Byron *et al.*, 2000; Söderman, 2006; Treweek, 1999) and sometimes only focused on superficial impacts (Mandelik *et al.*, 2005; Treweek *et al.*, 1993). In addition, the use of the precautionary approach was evident within the SKBH, MPA and CFR, which is essential when baseline information may be limited due to time and season constraints as was mentioned in the SKBH, MPA and CFR (Cooney, 2004; Dickson & Cooney, 2005).

4.3.2 Trends: Weaknesses within the SKBH

The following section summarises the weaknesses found in the SKBH and are discussed in relation to the MPA, CFR and international studies:

- i. **Review area 1:** In contrast to the MPA and CFR, the reports reviewed in the SKBH could be seen as lacking credibility due to the fact that many of the reports did not contain a declaration of independence and the specialists failed to provide their work experience and qualifications.

- ii. **Review area 2:** The SKBH, MPA and CFR studies recognised that most of the BIAs were limited by time constraints in that some areas were inaccessible, time periods for field visits were too short and often studies were conducted during the incorrect seasons. This will impact negatively on the baseline assessments and impact prediction. This weakness matches international findings (Byron *et al.*, 2000; Thompson *et al.*, 1997; Treweek, 1996).
- iii. **Review area 4:** Similar to international findings, the SKBH, MPA and CFR performed poorly in that there was a clear lack of a description of project pertaining to life cycles and sub-processes, including waste generation, vehicular movement, on-site staff facilities etc. Various international studies (Byron *et al.*, 2000; Söderman, 2005; Thompson *et al.*, 1997; Treweek, 1996; Treweek *et al.*, 1993).
- iv. **Review area 6:** In keeping with international trends the results demonstrated the SKBH, MPA and CFR did not adequately examine alternatives in terms of biodiversity considerations in that there is lack of detail in presenting and recommending the best alternative in terms of biodiversity impacts by considering a wider range of alternatives. (Söderman, 2006; Treweek, 1996).
- v. **Review area 7:** Despite the fact that South Africa has comprehensive legislation pertaining to biodiversity management (King *et al.*, 2009; Olivier *et al.*, 2009; Rumsey, 2009) the studies across the SKBH, MPA and CFR indicated a trend in not including all applicable legislation.
- vi. **Review area 8:** The SKBH, MPA and CFR all corresponded with international trends pertaining to the exclusion of consideration of biodiversity attributes during EIA public participation processes (Söderman, 2006; Thompson *et al.*, 1997).
- vii. **Review area 9:** Weaknesses identified during the assessments: very few reports included environmental thresholds, which correlates with international findings (Cooper and Sheate, 2002; De Villiers *et al.*, 2008; Sloomweg, 2005; Warnken and Buckley, 1998).
- viii. **Review area 11:** The SKBH, MPA and CFR all concur in terms of the findings that comprehensive monitoring in terms of the recommendations was drastically lacking. Similar findings were detected in international studies of lack of monitoring (Byron *et al.*, 2000; Söderman, 2006; Treweek, 1996; Treweek *et al.*, 1993; Warnken and Buckley, 1998).

4.4 Synopsis

This chapter has analysed the results of the assessment of the BIA report sample within the SKBH according to the BIA Review Package designed by Hallat (Hallat, 2014; Hallat *et al.*,

2015). The overall report quality of the sample was identified; the majority of the reports were found to be of just adequate standard (C) followed by being graded as inadequate (D). The results of the quality assessment were discussed under each review area 1 to 11 with the aim of identifying strengths and weaknesses within the review sample. These review area results were compared to the review area results found in the MPA and CFR studies (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016) and it was found that generally the reports performed similarly and trends were identified. However it could be said that the reports were graded slightly lower in the SKBH biodiversity hotspot in comparison to the MPA and CFR. Lastly trends, strengths and weaknesses that were acknowledged in the SKBH were pointed out in comparison to trends, strengths and weaknesses in the MPA, CFR and international research presented in chapter 2 above. Some serious weaknesses have been recognised within the SKBH. However, strengths have also emerged that are in contrast to international research and trends.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

The aim of this mini-dissertation included the evaluation of the quality of BIAs in the SKBH (an area with high biodiversity value) and to assess the biodiversity specialist contribution towards EIA reports. The reports were reviewed using the BIA Review Package designed by Hallat (Hallat, 2014; Hallat *et al.*, 2015). Hereafter the results obtained in the SKBH were compared to similar studies completed within the MPA and the CFR (Hallat, 2014; Hallat *et al.*, 2015; Swanepoel, 2016), furthermore comparisons between the SKBH, MPA, CFR and international studies on the inclusion of biodiversity into EIAs. Chapter 5 of this mini-dissertation will conclude on the findings in this research as well as propose recommendations that may be employed within the SKBH to improve the quality of biodiversity-inclusive EIAs. Lastly future research opportunities are offered.

5.1 Concluding remarks

With pressures and negative impacts on biodiversity ever-increasing, biodiversity-inclusive EIAs are becoming more important than ever (Wegner *et al.*, 2005:143; Atkinson, 2000:270). Biodiversity-sensitive areas (hotspots) need BIAs that afford a solid scientific basis for decision-making purposes in terms of proposed developments and with the hopes of avoiding further negative impacts on biodiversity (Bagri & Vorhies, 1997:19). This dissertation focused on one such area that is of global importance: the SKBH (Mucina *et al.*, 2006). This mini-dissertation reviewed the quality of 16 BIA reports conducted within the SKBH. The reports were assessed against the BIA Review Package as designed by Hallat and grades were given for each review area as well as overall report grades for each report (Hallat, 2014; Hallat *et al.*, 2015).

On analysing the reports' grades, overall and according to the 11 review criteria, it is apparent that BIAs completed within the SKBH have certain inadequacies. This research demonstrates that inadequacies that were prevalent in the MPA, CFR and international studies relating to biodiversity-inclusive EIAs in biodiversity-sensitive areas are to be found within the SKBH.

The following review areas were noted to have scored particularly poorly within the SKBH: expertise and professional conduct (review area 1), description of the project (review area 4), inclusion of legal aspects (review area 7), stakeholder consultation (review area 8) and monitoring (review area 11). Weaknesses that were trending with the CFR, MPA and international studies include: field assessments conducted during the incorrect seasons and over insufficient time periods, project descriptions were hardly ever included and where they were this was done on a superficial level, failure to comprehensively examine alternative from a biodiversity perspective, failure to include all relevant biodiversity legislation, failure to include environmental thresholds during impact prediction and the provision of inadequate monitoring programmes. The results of the analysis highlight that there are serious constraints being placed on BIAs, which may result in poor baseline data and insufficient information for decision-making purposes within the SKBH.

The research did however highlight some positive factors: the inclusion of ecological processes on-site and off-site, the precautionary approach was almost always put forward and comprehensive mitigation recommendations were provided. Almost all the reports provided excellent non-technical summaries for decision-makers and interested parties to have a proper understanding of the impacts, the bulk of the reports also provided clear impact assessment methodologies. Baseline description proved to be graded well assisted by the use of accurate and clear maps and inclusive biodiversity referencing, which often included guidelines, biodiversity assessments and data basis. A greater inclusion of SKEP sources would further contribute to baseline assessments and biodiversity conservation in the SKBH. Areas that

performed well within the SKBH have been recognised as: report clarity (review area 3), description of the baseline environment (review area 5) and recommendations for management (review area 10).

5.2 Recommendations

The section below provides recommendations aimed at addressing the challenges within the SKBH highlighted by the assessment of the BIA reports using the BIA Review Package. These recommendations may assist in improving the quality of BIAs conducted within the SKBH.

5.2.1 Inclusion of legislation, policies and guidelines

The results indicated that this aspect was severely ignored by specialists in the SKBH. Legislation regarding impact assessments and biodiversity along with policy documents and provincial guidelines aim to protect and conserve RSA's rich biodiversity. These statutory requirements and biodiversity management and action plans are drafted to maintain and reach certain biodiversity-conservation targets. Decision-makers need information in terms of how a proposed project is inconsistent or contributes towards local and national biodiversity objectives. This may indicate that decisions are being made without this information as none of the reports reviewed provided an indication of the level of compliance regarding the proposed project and provincial and national objectives. Specialists must incorporate local, provincial, national, regional and international legislation as well as policy documents such as SDFs and guidelines and comment on the level of compliance, contribution and inconsistencies. The applicability of the laws and policies must also be explained and legislation must not merely be listed for there to be effective biodiversity-inclusive EIAs (Hardner *et al.*, 2015:4).

5.2.2 Adequacy and appropriateness of biodiversity assessments

It is recommended that BIAs within the SKBH should be conducted with adequate allocated time frames, in appropriate seasons and consider indigenous knowledge input from stakeholders (Barrow, 2006; De Villiers *et al.*, 2008; Gullison *et al.*, 2015; Sallenave, 1994; Treweek, 1999). Specialists are advised to include field work dates, list stakeholders consulted, ensure that field surveys are adequately designed to assess the variation of biodiversity over time and include a methodology that assesses whether the field survey was in fact sufficient. There should be contingency funds made available for sufficient field surveys should this be required (Brownlie, 2005; Gullison *et al.*, 2015). Specialists must consider a wider host of alternatives that include seasons, phasing, scheduling, input and output processes and design alternatives; the “no-go” alternative is the minimum and further project designs should be

considered to avoid irreplaceable habitats and impacting on biodiversity (Brownlie, 2005:28; DEAT, 2004a; Hardner *et al.*, 2015; Söderman, 2006; Treweek, 1996). Finally, specialists do not view BIA reports as “stand-alone” documents that should not require cross-referencing with the EIA. This was particularly evident when assessing the inclusion of the project description and public participation. The project must be described, especially with regard to how certain activities may impact on biodiversity; this will enhance the effectiveness of BIAs within the SKBH (Slootweg *et al.*, 2006).

5.2.3 Improved mitigation and monitoring

It is recommended that due to the fact that many of the reports reviewed were limited by time and space constraints during field visits, that long-term monitoring should be recommended in these instances. This will assist in the verification of predicted impacts and effectiveness of the mitigation measures proposed and the drafting of a biodiversity action plan (Gullison *et al.*, 2015). All information obtained during baseline data studies should be stored on an online database, which could be run by the SKEP or the Northern Cape Department of Environment and Nature Conservation, whereby specialists can access this data when conducting BIAs in the SKBH (Marais *et al.*, 2015; Retief *et al.*, 2007; Swanepoel, 2016). Information gathered during the baseline field surveys can also greatly assist with the drafting of detailed mitigation and monitoring programmes, for example should restoration be recommended, the baseline information of pre-project conditions can be made use of (Gullison *et al.*, 2015). Mitigation plans must be site-specific, including clear mitigation targets and appropriate monitoring, taking into account the hierarchical systematic approach, and continue to adopt the precautionary approach where information is lacking and address the irreversible loss of biodiversity and seek positive enhancements (Tanaka, 2001; IAIA, 2005).

5.2.4 Adoption of best practice guidelines

From the data analysis it was pointed out that many of the BIA reports that were assessed referred to the Western Province Guidelines despite the fact that some of the developments were based in the Northern Cape (Brownlie, 2005). Biodiversity specialists must continue to make use of these guidelines until the Northern Cape adopts its own biodiversity-inclusive EIA guidelines, recommended by the National Biodiversity Framework (South Africa, 2009). Such guidelines would specifically deal with sensitive areas such as the SKBH and would mention the applicable literature that should be included such as the SKEP sources referred to in chapter 2. It is submitted that if the Northern Cape published such guidelines and specialists adopted the best practice guidelines, BIA report quality may be improved within the SKBH. Documents such as the Western Cape Best Practice Guidelines and the IAIA Biodiversity, Impact Assessment and Decision Making in South Africa guidance document should be taken into account when

drafting Northern Cape best practice guidelines (Brownlie, 2005; Brownlie *et al.*, 2006; 2005; De Villiers *et al.*, 2005). It is recommended that all provinces within RSA, particularly areas with high biodiversity value, adopt such best practice guidelines as has been done in the Western Cape and Gauteng (GDARD, 2014).

Biodiversity specialists should also adopt and incorporate international guidance documents such as the Guidance on Integrating Climate Change and Biodiversity in Environmental Impact Assessment (EC, 2013) and the Good Practices for Biodiversity Inclusive Impact Assessment and Management Plan and the Good Practices for the Collection of Biodiversity Baseline Data (Hardner *et al.*, 2015; Gullison *et al.*, 2015). This will further ensure that biodiversity specialists are kept up to date with and incorporate international best practices in BIAs within the SKBH. It is also advised that more specialists embark on peer review of reports especially in areas of biological importance (IAIA, 2005).

The adoption of guidelines by the province as well as by specialists may also remedy other challenges noted within the SKBH:

- i. The inclusion of specific and comprehensive terms of reference listed in the guidelines model terms can be provided for simple incorporation.
- ii. Addressing stakeholder consultation as well as socio-economic factors.
- iii. Inclusion of legal aspects.
- iv. The comprehensive consideration of alternatives.
- v. Improved mitigation and monitoring.

5.2.5 Ecological processes approach and report clarity

Similarly to the research of Swanepoel (2016) and Hallat (Hallat, 2014; Hallat *et al.*, 2015) the ecosystem approach was found to be a strength within SKBH, and for this reason it is included in the recommendations. Practitioners must continue to take the ecosystem approach but this can be further improved by involving stakeholders (including local communities) and including direct and indirect drivers that affect biodiversity within the SKBH. The adoption of ecosystem guidelines for the SKBH and making use of the SKEP resources will also further contribute towards an improved ecosystem approach (IAIA, 2005). Specialists are also advised to continue making reports “user-friendly” by incorporating a non-technical summary of impacts and inclusive biodiversity referencing to aid with decision-making (Keatimilwe & Ashton, 2005; Morrison-Saunders *et al.*, 2014).

5.3 Further Research

The aim of this mini-dissertation is to evaluate the quality of BIAs in the SKBH (an area with high biodiversity value) and to assess the biodiversity-specialist contribution towards EIA reports and the degree to which local and international trends concerning biodiversity input are prevalent in the SKBH was examined.

This research did not seek to answer the question as to “why” the BIA reports are of the quality identified after analysing the data. Further research could be undertaken by conducting interviews and/or compiling questionnaires for biodiversity practitioners within the SKBH to complete. This may provide further insight and explain the constraints, difficulties and their involvement in the EIA and BIA process.

Should guidelines be drafted for biodiversity-inclusive EIA for the Northern Cape, one could assess the quality of the BIA reports post the publication of the guidelines with the results obtained in this study. Research to draft guidelines for the Northern Cape should consider the latest international and national best practices and academic works such as these.

Similarly to the recommendation made by Hallat it may be prudent to also consider the biodiversity input in other stages of the EIA process such as screening, scoping and public participation (2014:65).

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ANNEXURES

Annexure A - BIA Review Package as designed by Hallat (Hallat, 2014; Hallat *et al.*, 2015).

SYMBOL	DESCRIPTION
A	Generally well performed, no important tasks left incomplete.
B	Generally satisfactory and complete, only minor omissions and inadequacies.
C	Can be considered just satisfactory, despite omissions and/or inadequacies.
D	Parts are satisfactorily attempted but must, as a whole, be considered just unsatisfactory because of omissions or inadequacies.
E	Not satisfactory, significant omissions or inadequacies.
F	Very unsatisfactory, important task(s) poorly done or not attempted.
N/A	Not applicable. The review topic is not applicable or it is irrelevant in the context of this BIA.

REVIEW TOPIC	COMMENTS FROM REVIEWER	score
Overall report quality SCORE:		
Review area 1: Expertise and professional conduct of specialist SCORE:		
1.1 Is a clear indication given of relevant qualifications, expertise and experience of the specialist who conducted the study		
1.2 Does the BIA contain the details of the person who		

prepared the report?		
1.3 Has a declaration of independence been provided?		
1.4 Has the specialist confirmed the validity of the information included in the report?		
Review area 2: adequacy and sufficiency of information SCORE:		
2.1 Has the specialist provided sufficient information for decision-making purposes in terms of the level of detail and reliability of findings?		
2.2 Does the specialist report contain the Terms of Reference (ToR) and to what extent has the specialist met all the requirements of the ToR for the specialist input?		
2.3 Where appropriate, has traditional or indigenous knowledge, pertaining to biodiversity, been incorporated into the study?		
2.4 Are there any uncertainties, gaps in knowledge or low levels of confidence in the assessment or evaluation? Are these uncertainties and confidence		

levels clearly stated?		
2.5 Is the degree of confidence in the impact assessment prediction clearly specified and explained?		
Review area 3: clarity of the report SCORE:		
3.1 Has a clear, non-technical summary been provided?		
3.2 Are the time and space boundaries of the study appropriate and adequately motivated?		
3.3 Are the sources of information clear and explicit, and has the specialist included a list of references?		
3.4 Has a description of the methodology adopted in preparing the report or carrying out the specialised process been given?		
3.5 To what extent does the specialist explain the purpose and scope of the study undertaken?		
3.6 Are opinions or statements justified and adequately motivated?		

3.7 Are conclusions derived from findings of study logically consistent?		
3.8 Is a summary impact assessment table included, using the defined impact assessment and significance rating criteria to evaluate different alternatives both with and without management actions?		
3.9 Is a description given of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment?		
Review area 4: description of the project SCORE:		
4.1 Has the purpose and need for the proposed project been clearly stated?		
4.2 Is there adequate description of the proposed project and alternatives to allow effective identification and assessment of potential direct, indirect and cumulative impacts (e.g. location, siting, routing, scheduling, activities, inputs and outputs labour, buildings and structures, infrastructure and operating scenarios)?		
Review area 5: description of the baseline		

environment SCORE:		
5.1 Is there adequate description of the key characteristics of the affected socio-economic and biophysical environment (as relevant to the specialist domain) including baseline conditions, sensitive receptors or resources, uses/users, anticipated trends and pressures, and future scenarios?		
5.2 Are off-site as well as on-site characteristics adequately described to provide the broader context within which the development is proposed, where it is clear that impacts of the proposed project would extend beyond the immediate site?		
5.3 Are clear and accurate maps, plans and possibly photographs, of the project and affected environment provided?		
Review area 6: consideration of alternatives SCORE:		

6.1 Has adequate consideration been given to the identification of reasonable alternatives to minimise the impact of the activity? (see full description)		
6.2 Have alternatives been addressed at a scale and level of detail that enables adequate comparison with the proposed project?		
6.3 Has the specialist identified the alternative that is the best environmental option from a biodiversity perspective?		
Review area 7: inclusion of legal aspects SCORE:		
7.1 Is the legal context of the study, in terms of biodiversity, been described and are legal requirements, including those arising from international agreements, clearly considered?		
7.2 Is the policy and planning context of the proposal described, and clearly considered (taking into consideration international, national, provincial and local policies and plans)?		
7.3 Have accepted standards and guidelines with regard to biodiversity been identified and clearly taken into consideration		

(e.g. National Spatial Biodiversity Assessment, DWA wetland delineation)?		
7.4 Have opportunities for the proposed project to support or contribute to the implementation of policy, plans or programmes been identified?		
7.5 Have inconsistencies, potential areas of conflict and or likely non-compliance between the proposed project and the legal, policy and planning context been clearly identified and the implications described?		
Review area 8: stakeholder consultation SCORE:		
8.1 Has a description of any consultation process that was undertaken during the course of carrying out the study been provided, and has a summary of the comments been included?		
8.2 Within the specialist's area of expertise, have key I&APs input to the EIA process, where the proposed project could have a direct and/or potentially significant effect on their particular or mandated area of responsibility or interest, been incorporated in the study?		

8.3 Where the EIA process has missed key stakeholders, and/or where additional stakeholder involvement is clearly needed to refine, or better define issues or impacts, has the specialist made adequate provision for such involvement?		
Review area 9: prediction and assessment of impacts SCORE:		
9.1 Have plausible environmental and operating scenarios been considered in the assessment?		
9.2 Has a clear description been given of the approach and methodology that have been used by the specialist to assess the impacts and has this been clearly motivated?		
9.3 Have linkages to other specialist inputs been identified and taken into account where relevant?		
9.4 Are clear, sufficient and explicit criteria used to assess positive and negative impacts of different alternatives, taking into account the planned mitigation and management?		
9.5 Have potential direct, indirect and cumulative impacts on		

important pattern, important ecological processes and associated areas (e.g. corridors), and on ecosystem goods and services (as relevant to the proposed project) on and beyond the site, been described, assessed and evaluated?		
9.6 Is there adequate attention to indirect or cumulative effects on significant or sensitive resources? Where potentially significant cumulative effects are possible, but cannot be addressed at the EIA level, has the need for higher order studies been clearly stated?		
9.7 Are there systematic, explicit and rational links from identification of key issues, through assessment to evaluation of significance?		
9.8 Are consequences of the predicted impacts made explicit?		
9.9 Is there a clear indication of whether impacts are irreversible or result in an irreplaceable loss of biodiversity or ecosystem		

services to the ecosystem and/or society?		
9.10 Have impacts been assessed and communicated in terms of the extent to which they support or conflict with the desired future state/vision of the area and sustainable development objectives (as described in relevant policies, plans and legislation)?		
9.11 Are the beneficiaries, and those who stand to lose from the proposed development, clearly identified where there are clear dependencies on ecosystem goods and/or services, highlighting vulnerable and risk-prone parties?		
Review area 10: recommendations for management SCORE:		
10.1 Is there a summary of key management actions that would fundamentally affect the significance of impacts on biodiversity if implemented?		

10.2 Has the management of the potential positive and negative impacts been systematically and adequately addressed (i.e. has the specialist considered measures for the avoidance, mitigation, restoration, rehabilitation or compensation of negative impacts in a hierarchical fashion; and have measures for enhancing positive impacts been considered)?		
10.3 Has the precautionary principle been applied to the recommendations for management and monitoring measures where there is uncertainty or high risk associated with impacts?		
10.4 Are recommended management actions practical, viable and in line with best practice? Are these clearly described and motivated?		
Review area 11: monitoring SCORE:		

11.1 Does the recommended monitoring program (es) include: the specific questions to be asked by monitoring; the frequency, season and timing for monitoring; responsibility for monitoring, analysis and implementation of responsive management actions; targets and indicators for monitoring; significance thresholds; and auditing and reporting requirements?		
11.2 Is the proposed monitoring program (es) practical, viable and in line with best practice? Has it been clearly described and motivated?		