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Biodiversity Management Principles:

A Cross-Sector Comparison of South African Companies

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Submitted 14.12.2016

DECLARATION

I declare that this research report is my own, unaided work. It is being submitted for the Degree of Masters of Science at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

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(Signature of candidate)

_____day of _____20_____in_____

Abstract

The interaction between business and biodiversity has seen growing importance in corporate management; impacting policy, practices and strategy. This study examines South African companies' assimilation of recommended biodiversity management practices, as communicated through their annual reporting and official websites. A selection of nine South African companies in the forestry, sugar and mining sectors were studied with regards to their reporting on biodiversity management practices. The research aimed to understand the extent of structured approach to biodiversity management, and explore potential sectorial differences.

The study found a wide acceptance of the UN Global Compact Principles, the GRI reporting guidelines and the King Code of good governance principles. However, the companies did not demonstrate a consistent governance structure for biodiversity management. The study revealed one mining company with a stronger biodiversity governance structure making the use of various dedicated policies and standards. Furthermore, the study identified few sector specific differences. Though the forestry sector demonstrated good practice with its emphasis on biodiversity in its supply chain management.

The study did not reveal a particular uptake of emerging biodiversity concepts such as No Net Loss, payment for ecosystem services or agroforestry, however the companies had adopted several sustainability and governance recommendations and standards. The study did not identify the existence, nor the use, of dedicated biodiversity certification programmes or South African developed cross-sector biodiversity certification programmes.

The finance sector is in a good position to positively influence corporate biodiversity management practices. However, the study results give an impression that there is untapped potential in the finance sector to further drive the biodiversity management agenda in South Africa.

Keywords: Corporate Biodiversity Management, Biodiversity Management Framework, Biodiversity Best Practices,

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Nomenclature

ABN Amro - ABN Amro Bank N.V.

ADU - Animal Demography Unit

ADvTECH - ADvTECH Ltd.

AFTA - Association of Temperate Agroforestry

BAP - Biodiversity Action Plan

BBOP - Business and Biodiversity Offset Programme

BEE - Black Economic Empowerment Programme

BMM - Black Mountain Mining

CBD - Convention on Biological Diversity

CEMEX - CEMEX S.A.B. de C.V.

COWI - COWI A/S

DEA - Department of Environmental Affairs

DJSI - Dow Jones Sustainability Index

DRC - Democratic Republic of Congo

DWAF - Department for Water Affairs and Forestry

EMP - Environmental Management Plan

EMS - Environmental Management System

EPA - Environmental Protection Agency

ERM - The ERM Group Inc

ESG - Environmental, Social and Governance

EUCAGEN - Eucalyptus Genome Network

EWT - Endangered Wildlife Trust

FAO - Food and Agricultural Organisation

FSC - Forest Stewardship Council

GDP - Gross Domestic Product

GIS - Geographic Information System

GPA - Global Programme of Action

GRI - Global Reporting Initiative

HBV - High Biodiversity Value

HCV - High Conservation Value

IBAT - Integrated Biodiversity Assessment Tool

ICFR - Institute of Commercial Forestry Research

ICMM - International Council on Mining and Metals

IFC - International Finance Corporation

IDP - Integrated Development Plan
IODSA - Institute f Directors in Southern Africa
IPIECA - International Petroleum Industry Environmental Conservation Association
IRMA - Initiative for Responsible Mining Assurance
ISO - International Organisation for Standardization
IUCN - International Union for Conservation of Nature
JSE - Johannesburg Stock Exchange
KLD - KLD Research & Analytics Inc.
KPI - Key Performance Indicator
KZN - KwaZulu-Natal
LaFarge - LaFarge Ltd. (The LaFarge group has now merged with Holcim)
MSCI - MSCI Inc.
NAS - National Academy of Science
NBBN - National Business and Biodiversity Network
NBI - National Business Initiative
NBSAP - Bational Biodiversity Strategy and Action Plan
NEMA - National Environmental Management Act
NEMBA - National Environmental Management: Biodiversity Act
NGO - Non-Governmental Organisation
NNL - No Net Loss
NPI - Net Positive Impact
OECD - Organisation for Economic Cooperation and Development
OTA - Office of Technology Assessments
PEFC - Programme for the Endorsement of Forest Certification
PES - Payment for Ecosystem Services
P&G - Procter and Gamble
SANBI - South African National Biodiversity Institute
SANParks - South African National Parks
SASA - South African Sugar Association
SDG - Sustainable Development Goals
SOCO - SOCO International Plc.
SRI - Socially Responsible Investment
SusFarMS - Sustainable Sugarcane Farm Management System
SWSA - Sustainable Wine South Africa

TABS - Toolkit for Assessing Biodiversity in the Supply Chain

TBL - Triple Bottom Line

UKZN - University of KwaZulu-Natal

UN - United Nations

UNEP - United Nations Environmental Programme

UNESCO - United Nations Educational, Scientific and Cultural Organisation

UNISA - University of South Africa

USD - US Dollars

WBCSD - World Business Council on Sustainable Development

WCED - World Commission on Environment and Development

WCMC - World Conservation Monitoring Centre

WEF - World Economic Forum

WESSA - Wildlife and Environment Society of South Africa

WRC - Water Research Commission

WRI - World Resource Institute

WWF - World Wide Fund for Nature

1. Introduction

Societal and economic models focusing on growth and monetary capital gain - in a world with limited resources - encourage unsustainable corporate behaviour in businesses (Meadows *et al.*, 1972; Meadows *et al.*, 2004; Jackson, 2009). The consequences of this unsustainable behaviour over the last century led to a global call for sustainable development, a term that achieved global recognition with the Brundtland Report (World Commission on Environment & Development (WCED), 1987). In the endeavour to achieve sustainability there is increasing pressure on business to develop a holistic capital perspective incorporating social and natural capitals (among others) in their aim to achieve value creation (Rezaee, 2016; Garcia *et al.*, 2016).

Natural capital is composed of the world's various environmental elements such as air, water and the earth's living organisms (World Forum on Natural Capita, 2015), and can be classified in three groups: natural resource stocks, land and ecosystems (Ochuodho and Alavalapati, 2015). The planet's natural capital includes the provision of a range of ecosystem functions and services to humans such as flood regulation and drinking water (Ochuodho and Alavalapati, 2015). These services are vital for the economic development and survival of humans (Paudyal *et al.*, 2016; Millennium Ecosystem Assessment, 2005).

Biodiversity is a key component of natural capital, supporting ecosystem productivity (Millennium Ecosystem Assessment, 2005). The importance of biodiversity for human survival is exemplified by 70% of the world's poor depending on the diversity of biological resources for their livelihood (Convention on Biological Diversity (CBD), 2016). Despite the recognition of the importance of biodiversity, the pressure on biodiversity is increasing and its losses are unprecedented (Millennium Ecosystem Assessment, 2005). Biodiversity loss over the last 50 years has been more rapid than in any other segment of human history (Millennium Ecosystem Assessment, 2005). The Stockholm Resilience Centre developed the planetary boundaries framework defining change thresholds to the Earth's natural systems, where surpassing these thresholds represents compromising the earth's ecosystem resilience (Rockström *et al.*, 2009). One of the nine planetary boundaries is biosphere integrity, referring back to genetic diversity and functional

diversity (Rockström *et al.*, 2009). The biodiversity related planetary boundary has been confirmed as crossed already (Steffen *et al.*, 2015).

Human development driving habitat loss, fragmentation and degradation are the key drivers to the decline in biodiversity (Millennium Ecosystem Assessment, 2005; Slingenberg *et al.*, 2009; Segan *et al., 2015;* Niemandt and Greve, 2016). Global targets to combat biodiversity loss as outlined in the Sustainable Development Goals (SDG) and the Aichi targets depend on private sector support and delivery (Houdet *et al.*, 2012; Burg and Bogaart, 2014; Habibullah *et al.*, 2016;). There is a realisation that government conservation activities alone cannot achieve the targets by 2020 (Aichi targets) and 2030 (SDGs) (Houdet *et al.*, 2012; Burg and Bogaart, 2014; Habibullah *et al.*, 2016;). However, it is not only business that has an impact on biodiversity, as biodiversity loss and degradation have a potential to severely impact business activities and economic development (Dempsey, 2012; Houdet *et al.*, 2012; Burg and Bogaart, 2014; CBD, 2016; Habibullah *et al.*, 2016) In terms of impact, the World Economic Forum (WEF) has rated biodiversity loss and ecosystem collapse as one of 10 most important global risks (WEF, 2016). Over the past 10-20 years, the growing realisation of the importance of business and biodiversity has resulted in a boom of guidelines, best practices and biodiversity tools for businesses to mainstream biodiversity in their management practices. Part of the biodiversity management literature is developed by, or in collaboration with, business through sector-based associations.

Unfortunately several studies have found that there are few businesses that incorporate biodiversity in their management framework and course of action (Burg and Bogaart, 2014). In a South African context, there are few studies on the uptake and adoption of biodiversity management practices by South African companies.

1.1 Purpose

In South Africa's strive to achieve sustainability there has been a strong focus on developing the legal framework to protect biodiversity, and South African companies have been faced with increasing legal and good practice requirements to manage their impacts. To date there have been few studies investigating the

corporate assimilation of biodiversity management recommendations, and there is scope for improving the understanding of South African companies' approach to biodiversity management. This study aims to further the academic understanding of the progress made to mainstream biodiversity into South African corporate management practices. An improved understanding of South African companies' achievements and challenges in approaching biodiversity management may support the corporate world to better address its impacts.

1.2 Aim and Objectives

The aim of this study was to identify and analyse biodiversity management practices among a sample of South African companies within industries known for their biodiversity challenges, and to identify available biodiversity management support material and its application.

The objectives of the study were to:

1. identify relevant biodiversity guidelines and best practice for the mining, the sugar and forestry industries, and to explore the level of awareness and use of these guidelines;
2. identify potential lender requirements with regards to biodiversity management for a sample of South African companies;
3. explore how a sample of South African companies has incorporated biodiversity in their management practices in the mining sector, the sugar industry and the forestry sector;
4. investigate how biodiversity may have influenced key business decisions of these companies.

1.3 Research Questions

The below research questions were considered in this study:

1. To what extent is biodiversity impact management considered and mentioned in company communication to the public?
2. Do the companies demonstrate a structured process to identify and manage their biodiversity risks and impacts?
3. Are there differences in awareness and approach to biodiversity management between the sectors?
4. Do the companies provide examples of where investment and/or operational activities have been adjusted to better address biodiversity concerns?

2. Background

2.1 Sustainable Development and Biodiversity

The idea of a need for 'sustainable development' has existed for a long time. However, sustainable use of a natural resource was first defined in Germany by Hans Carl von Carlowitz in 1713, who articulated the first concepts of sustainable forestry (Du Pisani, 2006). The societal development aspects to sustainable development were also discussed as far back as the 1800s with Malthus' 'Essay on the Principle of Population' discussing the potential concerns and limits to and ever growing number of human beings. The term 'sustainable development' was globally adopted with the Brundtland Report, 'Our Common Future', developed by the World Commission on Environment and Development (WCED) in 1987, and is defined as: "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs* (p.41)." Here the concept of sustainable development refers to the process or motion towards achieving sustainability. It is worth noting that the ideas summarised in the Brundtland report had already been published as early as 1898 by Alfred Russell Wallace in 'Our Wonderful Century'. The Brundtland Report did introduce the idea of sustainable development being built on three pillars - society, economy and environment (Du Pisani, 2006). One of the challenges with the term 'sustainable development' as defined in the Brundtland report is that it calls for equitable development, while also ensuring the conservation of natural resources. The two requests do not necessarily go hand-in-hand: human development is generally linked with an increased environmental footprint (Sneddon *et al*., 2006) and often a corresponding depletion of non-renewable natural resource. An example of understanding the essence of sustainable development is given by the Secretary General of the United Nations' description of sustainable development as a bridge between disciplines and political entities, as well as through time and space: "*Development is the midwife of sustainability, just as sustainability is the life support system for development*" (United Nations (UN) Secretary General, 2010, p. 3).

Nevertheless, since the middle of the 20th century, pressure on the natural environment has been mounting, with an economic growth-driven industrialisation model becoming intertwined with a growing focus on sustainable development and

poverty reduction. The global population increased from roughly 2.56 billion people in 1950, to about 6.85 billion in 2000 (Ortiz-Ospina & Roser, 2016); a jump of 167% over just 60 years. Gross Domestic Product (GDP) per capita has also increased from $449USD in 1960, to $9,476USD (World Bank, 2016), with natural resource use a key factor of production and driver of growth. The UN outlines global resource consumption (which is currently above the planet's capacity) and habitat transformation as other key environmental stresses that together with climate change can have the ability to change the environmental conditions irreversibly (UN, 2013). Other environmental stresses magnified by an industrial development path – and that on a global level are reaching a critical tipping point - include ocean acidification, damage to the phosphorous cycle and reduction of the ozone content in the stratosphere (Rockström *et al.*, 2009; Steffen *et al.*, 2015). The key anthropogenic drivers for this degradation relate back to the dependence on fossil fuels and industrial farming (UN, 2013). To build on the Millennium Development Goals and focus commitment to combat environmental and social issues, the UN Sustainable Development Goals (SDGs) were developed in 2015 to reflect key areas for development in the coming years (UN, 2015); these include several key environmental goals related to climate change, water, terrestrial and aquatic biodiversity. Currently there is a growing focus and understanding of the links between ecosystem degradation and its negative impacts on biodiversity, livelihoods and even correlation with climate change. This has resulted in an increased focus on the role of ecosystems for food and water security (Bindraban *et al.*, 2013). The UN's emphasis on resource depletion and ecosystem degradation is further exemplified with a study by Ceballos *et al.* (2015) comparing the loss of species per century to a baseline loss rate of species (due to natural processes) of two mammal extinctions per 10 000 species over a period of a 100 years. They found that the rate of loss of species over the last couple of centuries is 114 times higher than the baseline rate, and argue that a global sixth mass extinction is emerging.

The Emergence of Biodiversity as an Environmental Topic

The ideas of Charles Darwin and his theory on the origin of species has grown in acceptance and was generally confirmed in the 1930's and 1940's; this resulted in a clearer understanding of the concept of species, how they appeared, evolved

and become extinct. In the same period the research field of ecology grew, and the understanding of ecology's importance to conservation was emerging. This laid the foundation for the emerging concept of biological diversity (Andrade Franco, 2013). However, the concept of biological diversity was first discussed in the book *A Different Kind of Country* (R.F. Dashmann) as late as 1968. The concern for rapid declines in species received special attention in Norman Myers' book from 1979 called *The Sinking Ark: A New Look At The Problem of Disappearing Species*. In the 1980's and 1990's biological diversity received more intensive academic attention, and the abbreviated term biodiversity was coined at the Forum for Biological Diversity organised by National Academy of Science (NAS) and the Smithsonian Institute in 1986 (Andrade Franco, 2013). The Office of Technology Assessments (OTA) defined biodiversity in 1987 as "*the variety and variability among living organisms and the ecological complexes in which they occur*". They identified three levels of organisation within biodiversity - ecosystems, species and genes. The definition did not include reference to processes and functions, which would be essential to understand the status of an ecosystem (Noss, 1990). Noss (1990) building on earlier research argued that features such as species composition, structure and function are vital aspects of biodiversity. Biodiversity is today understood as the variety of living organisms on Earth with four main levels of organisation from genes, species, and ecosystem diversity to functional diversity (United Nations Environmental Programme (UNEP), 2010). Due to the complexity of biodiversity, mapping of species with subsequent monitoring is not on its own an adequate indicator for understanding the biodiversity status. A reliance on a limited number of indicators can lead to misleading interpretations (Noss, 1990). The Earth Summit in Rio de Janeiro in 1992 resulted in the establishment of the Convention on Biological Diversity that entered into force in 1993. The main purpose of the convention was, and still is, to conserve biodiversity, promote sustainable use and equitable sharing of its benefits (CBD, 2016).

The idea and concept of biodiversity developed in the same period as the sustainable development concept reached a global acceptance and common definition (Brundtland Report). The United Nations emphasise the close relationship between the two concepts in the report "The Future We Want" (paragraph 197, p.52) issued after the Rio+20 conference: "*…the intrinsic value of biological diversity, as well as the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and*

its critical role in maintaining ecosystems that provide essential services, which are critical foundations for sustainable development and human well-being". The importance of biodiversity to sustainable development is linked to being a source for food and income, as well as natural medicines. An example of the importance of biodiversity to human survival is the recent discovery of Brazilian wasp venom killing cancer cells whilst not affecting the healthy cells (Yoon *et al.*, 2016). Biodiversity is also more recognised as promoting healthy and functioning ecosystems which provide us with provisioning and regulating services such as clean water, flood control and nutrient cycling. For example microbial biodiversity in the soil is important for water efficiencies and plant nutrient uptake. Microbial biodiversity has the potential to improve ecosystem service delivery (water provisioning) and strengthen agricultural ecosystems (Brussard *et al.*, 2007; Bender *et al.*, 2016). Biodiversity, i.e. the ecosystem services and goods, are a potential source for income generation if used sustainably, especially among poorer and more rural communities. In a South African context, the sustainable harvesting of wild flowers (South African National Biodiversity Institute (SANBI), 2006) is an example of such a use.

The main reason for biodiversity loss is habitat loss and fragmentation (CBD, 2010; Segan *et al.,* 2015). The impacts on biodiversity from habitat loss and fragmentation are further exacerbated by climate change as it limits species' options to adapt to habitat loss. Climate change may create longer distances between suitable habitats (for migration) when a population's habitat is being degraded, and it increases the frequency of extreme weather events (drought, floods etc.), adding extra strain to flora and fauna populations under the stress of habitat loss (Segan *et al*., 2015). Habitat loss is mainly due to conversion of natural land to agricultural land and through unsustainable forestry activities. Anthropogenic activities such as infrastructure development, housing and mining activities are other important contributors to land conversion and habitat loss. Additional aspects contributing to biodiversity loss include nutrient load and other pollution, unsustainable consumption of natural resources and alien invasive species (CBD, 2010). The Global Biodiversity Outlook by the CBD (2006) confirmed an overall negative trend in conserving biodiversity with a continued high rate of deforestation and conversion of forests to agricultural land of an annual 6 million hectares lost since 2000. The stresses to biodiversity are increasing, and the average species abundance between 1970 and 2000 demonstrated a decline

of between 30% and 50% for the 3000 wild populations of species measured (CBD, 2006). The Convention on Biological Diversity in 2010 included a strategic plan for 2011-2020 in order to address the negative trends in biodiversity. Included in this plan is the aim to address key underlying drivers for biodiversity loss by mainstreaming biodiversity awareness and consideration across governments and societies, as well as reducing the direct pressures by promoting sustainable use of biodiversity resources. Through this, governments agreed to protect 17% of land and 10% of the sea by 2020, and to work towards preventing extinction of known threatened species (CBD, 2016).

Biodiversity in South African legislation

The oldest biodiversity-related legislative act in South Africa is the Environmental Conservation Act (Act 73 of 1989) that outlines the regulation of and process for establishing protected areas. The National Environmental Management Act (NEMA) (Act 107 of 1998) is the country's overarching environmental legislation outlining the overall provision for environmental management in the country. Key sets of legislation for companies managing their impacts to biodiversity include the Environmental Impact Assessment Regulations in NEMA which were last updated in 2014, as well as the National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004). NEMBA provides for a sustainable and equitable use of biodiversity resources in the country. Under NEMBA there are several regulations and lists controlling alien and invasive species, protected species, international trade of endangered species and hunting activities. South Africa followed up the Biodiversity Act by issuing a National Biodiversity Strategy and Action Plan (NBSAP) in 2005, outlining national conservation and biodiversity goals and objectives (DEA, 2005). South Africa's government is also controlling impacts on biodiversity through various forms of regional acts and ordinances, and regulatory tools.

The Biodiversity Sector Plan is a precursor-planning step in the development of the Bioregional plan and contains the official biodiversity priorities by all sectors in the municipality (Kanz *et al.*, 2015). The municipalities also make use of the Integrated Development Plan (IDP) for land use planning and development. These regulatory planning tools can support companies in identifying

areas of high biodiversity value and conservation with areas that are more suitable for industrial development. South African companies are further guided by sector specific legislation and regulations such as the Sugar Act (Act 9 of 1978), which includes regulatory stipulations for the use of pesticides and fertilisers (with an indirect impact on biodiversity), and the National Forest Act (Act 84 of 1998), which includes a list of protected tree species.

For the mining sector, the Department of Environmental Affairs issued the "Mining and Biodiversity Guideline: Mainstreaming Biodiversity into the mining sector" (Department of Environmental Affairs (DEA) *et al.*, 2013) outlining key biodiversity management principles for the sector. A similar sectorial biodiversity guideline has not been identified for the forestry sector or the sugar industry.

Non-legislated Biodiversity Requirements

South African companies may face additional requirements with regards to biodiversity management depending on whether they are listed on the Johannesburg Stock Exchange (JSE), obtaining external funding or initiating partnerships with other organisations. To be listed on the JSE, mining companies (unlike other sectors) are required to disclose their environmental management and funding approaches in their annual reports (JSE, 2016a). Companies listed on the JSE are also required to disclose a statement regarding their adherence to the King III Code of Corporate Governance (JSE, 2016a), which includes principles on sustainability such as the board being required to integrate strategy, risk, performance and sustainability (principle 2.2) (Institute of Directors in Southern Africa (IODSA), 2009; ADvTECH, 2015). The companies are furthermore required to integrate their sustainability reporting with their financial reporting (principle 9.2), and to have independent assurance of their sustainability reporting (principle 9.3) (IODSA, 2009; ADvTECH, 2015). These requirements may have indirect influence on biodiversity management, although there is no direct, specific biodiversity management requirement for a company listed on the exchange. The JSE introduced the Socially Responsible Investment (SRI) Index in 2004 where all listed companies were reviewed against a set of environmental, social and governance criteria, and the best performing companies were nominated to be listed on the SRI index (JSE & FTSE Russell, 2015). The Johannesburg Stock Exchange initiated a

partnership with FTSE Russell in 2015 to further its work on promoting sustainable corporate practices (JSE, 2016b). The exchange has also adopted the FTSE Environmental and Social Governance ratings and created two new indexes, the FTSE/JSE Responsible Investment Index and the FTSE/JSE Responsible Investment Top 30 Index.

There were no index lists published for 2015 due to the change in methodology, whilst an updated 2016 Responsible Investment Index was published in September 2016 (JSE, 2016b). Being identified as one of the Responsible Investment Top 30 indexed companies may function as a competitive incentive to improve environmental management practices, and hence may have an indirect influence on a company's biodiversity management practices. The environmental assessment is composed of five themes and biodiversity features as one of the themes. The scoring takes into account the company's exposure to a certain risk. A higher risk exposure would result in a more stringent scoring assessment (FTSE, 2016). The new approach from JSE (in collaboration with FTSE Russell) to recognize responsible companies may provide an increased incentive for South African companies to manage biodiversity aspects of their business.

South African companies seeking financial support also face requirements from lenders via standards deployed by the lending institution(s). For example, the Equator Principles which were developed by signatory members of the Equator Principle Association (Equator Principles, 2010) outline a set of minimum requirements which include biodiversity considerations within principles two and three (Equator Principles, 2013). Currently about 80 banks globally have signed up to the Equator Principles, which are based on the International Finance Corporation (IFC) Performance Standards (Equator Principles, 2011). The IFC Performance Standards are a set of cross-sectorial management standards applicable to companies obtaining funds from a lender institution that has signed up to these standards. In addition, 32 export credit agencies of the Organisation for Economic Cooperation and Development (OECD) countries are using the IFC performance standards for their benchmarking exercises (IFC, 2016). There are three commercial banks in South Africa that have signed up to the Equator Principles - FirstRand Ltd, Nedbank Ltd. and Standard Bank of South Africa Ltd. (Equator Principles, 2011). Therefore the financial sector in South Africa is to some extent influenced by the Equator Principles and the IFC Performance Standards in

its endeavour to ensure responsible investments. However, Nedbank Ltd. informs that the IFC performance standards would only be applicable for finance transactions above 10 million USD (Nedbank, 2016) in line with Equator Principles recommendations (Equator Principles, 2016). However, the IFC recommendation is to apply the standards based on risk and exposure based criteria (IFC, 1998). Nedbank's application of the standards may result in investing in smaller projects with considerable risk exposure without sufficient management standards in place.

The IFC Performance Standard 6, "Biodiversity Conservation and Sustainable Management of Living Natural Resources," relates to biodiversity impact management specifically, (IFC, 2012). The IFC has similarly developed biodiversity guidelines providing an overview of issues surrounding biodiversity and business (IFC, 2015). IFC Performance Standard 6 contains specific requirements with regards to applying the biodiversity mitigation hierarchy. There are also various management requirements depending on project context - activities to take place in modified habitat, habitat of significant biodiversity value and/or protected areas. The standard also includes specific requirements with regards to No Net Loss and developing a biodiversity offset strategy (IFC, 2015). The IFC biodiversity standard would be applicable to South African projects obtaining financing from Nedbank, Firstrand or Standard Bank if meeting the individual bank's specified criteria of application.

2.2 Corporate Biodiversity Management and Reporting

In the 1990's the translation of sustainable development to fit a corporate context was summarised with the triple bottom line (TBL) concept of People, Planet & Profit by John Elkington (Economist, 2009). The triple bottom line urges companies to balance financial performance with non-financial aspects, as well as incorporating stakeholder concerns in addition to shareholder priorities (Garcia *et al.*, 2016). Current thinking on integrated corporate reporting emphasises the need to include six capitals. Forum for the Future (2009) and the Sigma Project (2003) makes use of a five capitals model including: human capital (capabilities, skills and welfare), manufactured capital (built environment such as buildings, transport networks and production facilities), social capital (social systems, structures and

networks), natural capital (natural resources, and the services and provisioning provided by the natural resources) and the financial capital (monetary assets and values). There is also a growing debate to further include intellectual capital (patents and literary works) and cultural capital (heritage, diversity, eco-cultural civilisation) (Comolli, 2006; UN Secretary General, 2010; Nuryaman, 2015; Zhang *et al.*, 2015). Sustainability in a corporate context can be interpreted as the improvement or growth in one of these capitals without negatively affecting one or more of the other capitals. From an environmental perspective it is interesting to note that only one capital represents environmental preservation. However, the environmental pillar forms the basis for all the other capitals, as they are dependent on the natural capital.

In a survey done by BSR (2015) of over 400 sustainability professionals across industries and continents, it was found that sustainability professionals saw an increase in integration of sustainability into company practices with top priorities focusing on human rights and climate change (BSR, 2015). However, the integration of sustainability considerations in strategic management has not seen the same success (Engert *et al.*, 2016).

A survey conducted by Matrix Consulting in 2007 on behalf of the South African Mining and Biodiversity Forum, the Chamber of Mines of South Africa and the International Union for Conservation of Nature (IUCN) identified a series of gaps and areas for improvement with regards to biodiversity management practices by South African mining companies. The main gaps identified included integration of biodiversity into existing environmental systems and processes, biodiversity monitoring and reporting (a tendency to focus on rehabilitation), biodiversity benchmarking and external auditing, as well as the biodiversity skills and capabilities within both the mining sector and the relevant authorities. They also identified the lack of priority given to biodiversity by the companies as another important issue for the sector. The companies would tend to give precedence to management issues perceived as more directly related to the operations (Matrix Consulting, 2007). A performance review by the IUCN and the International Council on Mining and Metals (ICMM) found that the member companies of the ICMM across the world had a significant improvement in further developing their biodiversity management systems and integrating biodiversity into policies, strategies and impact assessments, as well as their stakeholder engagements (e.g. incorporation at the strategic level). However, the companies had a greater

difficulty demonstrating that this resulted in improved site performance (The Biodiversity Consultancy, 2014).

Business has the opportunity to play an important (and positive) role in the aim to conserve biodiversity as part of the world's ambition to achieve sustainable development. Furthermore, companies may gain economic upsides through better addressing their interdependencies with biodiversity, through better risk management and improved reputation, as well as increasing staff morale. In order to best take advantage of the relatively recent trends in biodiversity understanding and management, companies are required to integrate biodiversity considerations into their structures and systems, and more importantly into their core management system elements (Earthwatch Institute *et al.*, 2002).

Corporate Biodiversity Management Guidelines – a critical review

Corporate biodiversity management has over the last 10-15 years received increased attention globally and in South Africa, resulting in the development of various biodiversity and business initiatives, guidelines and support material, and strengthened legal requirements and governance. Currently, there are a large number of requirements, standards and best practice materials for a single company in South Africa to consider. There are for example a number of guidelines and information materials developed by organisations such as the IUCN, Food and Agricultural Organisation (FAO), UN, ICMM, SANBI, South African Sugar Association (SASA) and several other organisations. The UN Global Compact is for example an initiative supporting companies across the world to improve their sustainability through a set of ten principles. Principles 7, 8 and 9 relate to environmental management. The principles emphasise environmental precaution, environmental responsibility and greener technology, which have an indirect relevance to biodiversity. The UN Global Compact Principles include various support resources such as a guide to corporate sustainability and frameworks for implementation (UN Global Compact, 2016). South African companies can choose to be guided by the voluntary King Code where the King IV principles were issued in 2016. It is a set of principles promoting good corporate governance and integrated reporting (IODSA, 2016). A survey of the annual reporting of ten South African companies listed on Johannesburg Stock Exchange demonstrated that the King III principles at the time had both positive and negative effects on the

companies' reporting where one of the key observations was that there was a considerable increase in repeated information (Solomon & Maroun, 2012).

The IFC Performance Standard on Biodiversity contains a challenging requirement of achieving No Net Loss (NNL) if specific applicability criteria are fulfilled. South African companies seeking external funding may therefore find no net loss a requirement (IFC, 2012). No net loss refers to company impacts being balanced out to achieve a net zero impact on biodiversity. The reference to "net" recognises biodiversity losses in certain areas or at certain times of the company's activity, and there would not necessarily be a perfect balance between time or space of the impacts occurring and the compensatory benefits. One of the challenges with this requirement is that there is currently no universal definition of NNL (Aiama *et al.*, 2015), and it can be difficult to measure (Virah-Sawmy *et al.*, 2014). A closely linked concept is Net Positive Impact (NPI), which refers to company impacts being outweighed by conservation measures in order to achieve a net positive impact on biodiversity. The Biodiversity Consultancy (2012) identified 38 companies in total working towards NNL or NPI (total number of companies surveyed was not stated). Two companies had committed to NPI (Solid Energy and Rio Tinto) (NPI Alliance, 2015). The remaining companies would have committed to No Net Loss. The leading sector with regards to driving the NNL and NPI concepts is the mining sector with 15 out of the 38 companies representing this sector, followed by the energy and manufacturing sector (Biodiversity Consultancy, 2012). To date, agricultural and forestry companies have not made any commitments towards No Net Loss. This is an interesting note as the agricultural and forestry companies have larger location flexibility than companies in the extractives sector (Aiama *et al.*, 2015).

An important marked-based instrument to support sustainability governance and performance in companies is the use of certification programmes. This study did not find evidence of existing biodiversity-specific certification programmes relevant for the forestry, sugar and mining sector. However, there are numerous sustainability certification programmes for the forestry sector with some of the more globally recognised programmes being Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC). FSC integrates biodiversity in its management principles through principle 6 stating; "*to maintain or restore the ecosystem, its biodiversity, resources and landscapes*", and principle 9 stating; "*to maintain or enhance the attributes which define high*

conservation value forests" (FSC, 2016). Each principle is further detailed with a set of management criteria (FSC, 2015). Having said that, a study by Masiero *et al.* (2014) found that one of the main gaps identified when comparing forestry specific standards, guidelines and certification programmes was related to protection of biodiversity and ecological processes.

There are fewer sustainability certification programmes targeted for the sugar industry, with the BonSucro programme being one of the most globally known programmes. The Sustainable Sugarcane Farm Management System (SusFarMS) is a South Africa developed initiative by the South African Sugar Research Initiative, the South African Cane Growers and the Department of Water Affairs and Forestry. The SusFarMS management system includes an overview of legal requirements and an overview of best management principles where several of these principles include biodiversity related management and conservation principles (SASA, 2015a). Therefore a SusFarMS adherence or certification may directly impact a company's biodiversity management performance. This is supported by Hardt *et al*. (2015) in their study on the coffee industry in Brazil where certification programmes tended to have positive influence on levels of deforestation and reducing the conversion of natural forests (Hardt *et al.*, 2015). A limit to certification programmes in the agricultural sector is high implementation costs, which can lead to certification monopoly (only larger and more dominant firms can afford certification, and hence they gain an even larger dominance in the market through certification) (Auriol & Schilizzi, 2015). For the mining sector there are various certification programmes; here the Initiative for Responsible Mining Assurance (IRMA) is the most globally known standard and certification. The standard includes a section on biodiversity management practices in protected areas, and areas outside officially protected areas (IRMA, 2016).

International Organisation for Standardization (ISO) has developed the ISO14001, which is a globally accepted cross-sector environmental certification programme with potential to influence the biodiversity management performance of a company. The ISO14001 Environmental Management System certification is an example for how a company can demonstrate that it has a structured approach to managing its environmental impacts. However, having a recognised environmental management system in place does not necessarily mean that environmental impacts are reduced adequately. For example the ISO 14001 standard is process-oriented as opposed to performance oriented and as such

does not necessarily require a company to increase its abilities to actually reduce its environmental impacts. Some firms may adopt the management standard only in order to legitimise its activities and build external acceptance, rather than for genuine positive environmental impact improvements. It therefore becomes a bureaucratic exercise as opposed to an exercise with genuine interests in reducing external impacts (Ferron-Vilchez, 2016).

Another market-based driver influencing company sustainability practices is sustainability reporting. The Global Reporting Initiative (GRI) is among one of the most globally accepted sustainability reporting standards and its adoption rate of companies is increasing (Siew, 2015). It incorporates several reporting metrics on biodiversity related to the themes red-listed species, protected areas, land disturbed and land rehabilitated, as well as a biodiversity important fresh water bodies (EN-11, EN-12, EN-13, EN-14 and EN-26) (GRI, 2014). The G4 edition of the reporting guide was issued in 2014, whilst in October 2016 GRI moved from reporting guidance to the development of a reporting standard (GRI, 2016). The partial or complete compliance with GRI guidelines can increase consistency and transparency in the biodiversity management area (Cipullo, 2015). However, the risk of a globally standardised set of biodiversity indicators is that the indicators may become irrelevant or meaningless in a local context (Noss, 1990), and reporting according to GRI guidelines does not automatically mean the company is working its way towards sustainability (Isaksson & Steimle, 2009; Dumay *et al.*, 2010; Boiral, 2013). A concern with extensive sustainability reporting standards such as GRI is that it may lead companies to be less concerned with actually addressing its impacts, as opposed to criteria-demonstrated performance. The GRI guidelines have been further criticised for being skewed towards social reporting metrics. Albeit the reporting metrics are detailed and numerous, it will in the end not provide the average consumer with the simple answer of how sustainable the company actually is (Fonseca et al., 2012; Siew, 2015). Furthermore, voluntary reporting approaches may allow companies to have a selective approach to what is reported, preferring to report on the positive as opposed to negative trends (Lahtinen *et al*., 2015). From a corporate perspective, a key benefit with environmental reporting according to accepted practices is legitimising the company and its activities (Braam *et al.,* 2015).

Other reporting tools and standards include for example the Carbon Disclosure Project (Siew, 2015). Linked to sustainability reporting are company

tools to better understand the company's sustainability performance compared to peers i.e. benchmarking. Examples of benchmarking tools are Dow Jones Sustainability Index, KLD Research & Analytics Inc. (KLD) Global Sustainability Index and rating, MSCI (MSCI Inc.) Environmental, Social and Governance (ESG) Indices or the FTSE44Good Index, Environmental Sustainability Index, Ecosystem Service Benchmark and Trucost (Siew, 2015).

The South African Mining and Biodiversity guidelines recommend the use of a biodiversity mitigation hierarchy in line with several other recommended hierarchies (Business and Biodiversity Offset Programme (BBOP), 2016; International Flora and Fauna, 2016). The key message from the mitigation hierarchy is the order of considering biodiversity mitigation measures starting with avoiding impact. In a report by Cambridge Conservation Initiative (2015), three main approaches to avoid biodiversity impacts were identified - spatial, temporal and design. At the same time, the survey respondents identified "knowing what to avoid" as the key challenge to efficiently avoid biodiversity impacts. IUCN guidelines have in addition included biodiversity enhancement opportunities in their proposed version of a biodiversity mitigation hierarchy (IUCN, 2014, p.49). The mitigation hierarchy has received extensive global academic attention in terms of developing best practice, however this has unfortunately not resulted in the desired level of implementation in practice (Tallis *et al.,* 2015). A study by Jacob *et al.* (2016) on the effectiveness of the mitigation hierarchy's implementation on marine ecosystems in French waters studied 55 impacts assessments and found that there were several inconsistencies with the mitigation hierarchy. There were relatively few mitigation measures with regards to avoiding impact, and only 13% of all the proposed mitigation measures achieved avoidance. Furthermore, of all the mitigation measures proposed, only 64% of the environmental impacts were reduced to low impacts, in contrast to the 79% for socio-economic impacts that were reduced (Jacob *et al.*, 2016).

In the agricultural sector (including the sugar sector), the approach agroforestry has been promoted as a more sustainable practice where agricultural crop cultivation is combined with forestry or shrub cultivation. The aim of agroforestry is to increase productivity and sustainability of the crops through biological interactions (Association of Temperate Agroforestry (AFTA), 2016). These systems may have better performance at controlling runoff, maintaining biological soil activity and improved nutrient cycling (Torralba *et al*., 2016) (Schwab

et al., 2015). According to a study by Pumarino *et al.* (2015) agroforestry also demonstrated reduced presence of pest and plant damage for perennial crops such as plantains while this benefit was not demonstrated for annual crops such as maize. The study also demonstrated a lower presence of weeds. However, a study in Australia (Sudmeyer and Hall, 2015) concluded that combining a crop with an Australian eucalyptus (mallee) would not result in an increased biological productivity as there was low resource complementarity between the eucalyptus and the crop grown (generally wheat).

However, the reality may be that companies have a different understanding of the need and urgency to manage their biodiversity impacts over and above what is required as a minimum by law and lending institutions. Currently there is a wealth of information on best practice and guidelines supporting South African companies in their endeavour to manage their biodiversity impacts. A study by Winn & Pogutz (2013) confirms there is an increased tendency by multi-national companies to embark on ecosystem management and often in collaboration with nature conservation organisations and Non-Governmental Organisations (NGO). This study has generated an overview of key biodiversity guidelines and tools that is included in Appendix 1. Although not a complete list, it provides an overview of key support material available to South African companies. The numerous sustainability concepts and frameworks have been frequently researched in terms of strength and weaknesses, whilst less in terms of level of implementation (Engert & Baumgartner, 2015). Biodiversity concepts have received even less consideration in research literature. A study by Engert *et al.* (2016) concludes the need for generating more empirical based research in the field of integrating sustainability considerations in strategic management including considerations for how integration could be performed in practical terms. There is similarly little research on adoption of sustainable biodiversity practices by South African companies in the forestry, sugar or mining sector.

A specific gap in the research literature emerges on whether companies make use of biodiversity specific concepts and tools (such as No Net Loss, Payment for Ecosystem Services, Biodiversity Risk Matrix, Biodiversity Mitigation Hierarchy and Biodiversity Action Plans), as well as what general recommendations for biodiversity management practices being operationalized in South Africa should be. As a result of this research gap, this study aims to further explore and investigate the interest and uptake of biodiversity management

practices by South African companies in the forestry, sugar and mining sector, to better understand the applicability and value that current biodiversity management support materials and research have in these sectors.

Corporate Biodiversity Management Tools

This section discusses some of the main management tools identified through the review of biodiversity management guidelines highlighting the most important tools and emerging practices.

The Holcim-IUCN collaboration has resulted in a guideline outlining key elements of a dedicated biodiversity management system (IUCN and Holcim, 2014). The management system includes a specific Biodiversity Risk Matrix that combines the consideration of the impact severity with the biodiversity importance of an area and the reversibility of the impact. The impact severity categorisation is similar to several other methodologies outlined in guidelines such as the ICMM Good Practice Guidance (ICMM, 2006), the British American Tobacco Partnership's Biodiversity Risk & Opportunity Assessment Handbook (British American Tobacco Biodiversity Partnership, 2012) and the Good Practices for Biodiversity Inclusive Impact Assessment and Management Planning for the finance sector (Hardner *et al.*, 2015). However, these guidelines do not have a 2-step approach to assessing the biodiversity value of the area and impact severity in order to determine the overall risk to biodiversity. Furthermore, other methodologies identified considered species conservation status in order to determine consequence, as opposed to IUCN and Holcim's proposed approach of considering the reversibility of the impact in order to determine impact severity. The recommended approach by the IUCN and Holcim enables a targeted risk assessment methodology for biodiversity risks while it takes into consideration the potential or actual impacts on biodiversity. Therefore it may support companies in achieving a more accurate understanding of the biodiversity risks they are facing, and how the risks link up with their operational impacts. A potential weakness of the matrix is that it relies on the local authorities having done appropriate assessment and establishment of protected areas whilst this may not always be the case (Duijm, 2015).

Biodiversity Action Plans (BAP) are advocated by, for example, the International Petroleum Industry Environmental Conservation Association (IPIECA) and ICMM guidelines, and are also mentioned by the South African mining and biodiversity guidelines. However, the guidelines do not include a discussion nor a description of BAPs. In South Africa a company is required to develop and implement an action plan for their environmental management as part of their Environmental Management Programme, while there is no specific legal requirement for a BAP. Similar requirements for a dedicated biodiversity action plan have not been identified, and there is not evidence of existing academic studies on the level of implementation and/or effectiveness of corporate BAPs, indicating a potential gap in the research literature.

Biodiversity offsetting is a key component of achieving No Net Loss or Net Positive Impact once options of avoidance, minimisation and restoration have been exhausted. A biodiversity offset occurs when a negative impact to biodiversity from an anthropogenic development or activity is compensated through a measurable conservation outcome (BBOP, 2013). The Business and Biodiversity Offset Programme (BBOP) have developed an international standard with regards to biodiversity offsetting (BBOP, 2012). Some of the critiques of biodiversity offsetting relate back to applying economic logic and valuation to items with intrinsic values. It can be seen as a management approach construed towards legitimising governments and corporations in cases where developments have significant and long-term (or permanent) biodiversity impacts (Spash, 2015). South Africa currently does not have a national legislated requirement for biodiversity offsets, while this has been in planning for the last few years. However, there is room for the competent authority to require evaluations of feasibility for offsetting as part of the permitting process, and include offsetting plans as part of the permit conditions. Similarly, the Department of Energy requires offsetting for renewable energy projects, while SANBI has developed a national guideline for wetlands offsetting (Jenner & Balmforth, 2015). KwaZulu-Natal and Western Cape are two of nine provinces having developed regional offsetting guidelines. The South African approach to biodiversity offsetting aims at achieving ecosystem resistance above minimum thresholds through considering the biodiversity offsetting relative to the conservation targets for habitats and ecosystems as opposed to baseline conditions of the area in question (Jenner & Balmforth, 2015). There are several examples of companies having implemented biodiversity offsets in South Africa,

such as the road widening of Shaw's Pass in Western Cape, the Black Mountain Mining (BMM) in Karoo and the Vele Colliery's biodiversity agreement with DEA and the South African National Parks (SANParks). Some of the challenges in South Africa with regards to implementing biodiversity offsets have been obtaining land management agreements or to secure nature reserve status as these activities extend over a longer time period that is often underestimated (Jenner & Balmforth, 2015).

Ecosystem Management (Leech *et al.*, 2009) or Ecosystem-based Management (UNEP and Global Programme of Action (GPA), 2006) is a more holistic approach to biodiversity management. The approach focuses on how the ecosystem may provide services to human societies such as for example drinking water, nutrient cycling, flood and drought regulation etc. The ecosystem approach has grown increasingly popular in the for-profit organisations as it includes a scope for business opportunities resulting in improved ecosystem services. The ecosystem services approach could also have a higher chance of buy-in with local communities, especially in rural areas, as the aim of the conservation effort is not to deny access or the use of a natural resource, but rather to enhance the availability of key services. Hence the approach has the opportunity to obtain buy-in and interest from groups that would not necessarily have been interested in conservation (Ingram *et al.*, 2012). A useful corporate tool to better understand the company's interdependencies on ecosystems is the Ecosystem Services Review developed by World Resource Institute (WRI) and World Business Council on Sustainable Development (WBCSD). The intention is for the tool to support the businesses in developing adequate ecosystem services based management strategies. A critique of the ecosystem approach is that it has a focus on the benefits derived by human beings, and therefore might miss benefits and costs to ecosystem and/or species. This is especially the case where the ecosystem service or species does not have a direct and/or recognised value for societies (Ingram *et al.*, 2012). Furthermore, some cases of enhancing certain ecosystem services may undermine other ecosystem functions (Ingram *et al.*, 2012). The ecosystem services approach tends to make use of estimating the monetary value of the ecosystem services in order to drive the business case for conservation. In a corporate context, the WBCSD has issued a guide to corporate ecosystem valuation as an aid to corporate decision-making (WBCSD, 2011).

According to Bagstad *et al.* (2013) the valuation of ecosystem services approach has seen an emergence of tools supporting integrated decision-making. The study lists key tools according to process of determining ecosystem services valuation (Bagstad *et al.,* 2013, p. e36) - impact screening tools, modelling tools at landscape level, modelling tools at site level and non-monetary valuation approaches. Payment for Ecosystem Services (PES) is a concept that may be applied when taking the ecosystem services approach to managing biodiversity impacts. Some examples of payments for ecosystem services include permits and bio-prospecting rights, tradable wetland mitigation credits, biodiversity credits or various forms for concessions (Forest Trends *et al.*, 2008). The intention of Payment for Ecosystem Services is to incentivise sustainable use of ecosystem services (Forest Trends *et al.*, 2008). For example in Tanzania, tour operators in the Tarangire National Park have set up a PES agreement with the Masaai community with regards to wildlife protection and grassland maintenance (Ingram *et al.*, 2013).

The Importance of Biodiversity Management in South Africa

In 2004 the South African government issued the results of a national spatial biodiversity assessment, with the conclusion that 34% of the 440 terrestrial ecosystems in South Africa were under threat. The 2012 update to this assessment demonstrated the various ecosystems and the percentage of the ecosystem being critically endangered, endangered, vulnerable and/or least threatened (SANBI, 2013).

TABLE 2.1 PERCENTAGE OF ENDANGERED SOUTH AFRICAN ECOSYSTEMS (SANBI, 2013)

Biome	Critically Endangered	Endangered	Vulnerable	Least Threatened
Albany Thicket	-	-	-	100%
Desert	-	-	-	100%
Forest	5%	40%	30%	25%
Fynbos	13%	14%	18%	55%
Grassland	10%	11%	36%	43%

	Terrestrial	Freshwater	Estuarine	Marine
Habitat Loss and Degradation	XXX	XX	XX	XX
Flow Modification	X	XXX	XXX	X
Invasive Alien Species, Hybridisation and GMO's	XXX	XXX	X	XX
Over-harvesting	XX	X	XXX	XXX
Pollution	X	XX	X	X
Climate Change	XXX	XXX	XXX	XX

Indian Ocean Coastal Belt	50%	9%	16%	25%
Nama-Karoo	-	-	-	100%
Savannah	8%	10%	14%	68%
Succulent Karoo	-	-	5%	95%
*All percentages are approximates as interpreted from SANBI figure				

As the data suggest, biodiversity loss is a critical issue to South Africa with 50% of ecosystems such as the Indian Ocean coastal belt already in a critically endangered state. The national red list assessment (years) demonstrated similar discouraging facts where 20% of South Africa's mammal species and 10% of its bird and frog species are threatened. Similarly the government has concluded that there are substantial impacts on inland water bodies and wetlands where 82% of the main river ecosystems are threatened (DEA, 2009). These high percentages indicate a substantial threat to biodiversity in South Africa, with a number of these driven by anthropogenic causes as outlined in Table 2.2 below. The key threats are very similar to the main factors driving biodiversity loss globally, with the addition of (water) flow modification and invasive alien species, which feature more predominantly in the South African context.

TABLE 2.2 MAIN ANTHROPOGENIC THREATS TO SOUTH AFRICA'S BIODIVERSITY (DEA, 2009)

*Footnote: xxx=high, xx=medium, x=low

The key reasons for the rapid habitat conversion and subsequent biodiversity loss link back to human expansion and economic growth, creating pressure and demands on natural resources to feed into industrialisation. This research focused on the largest natural resource industries associated with high biodiversity impacts in South Africa: forestry, agriculture and mining. Sugarcane farming was selected as a specific industry sub-group to agriculture due to its tendency towards large-scale farming, and therefore with corporate structures more comparable to those in the mining and forestry sectors.

According to the World Bank (2015) about 80% of South Africa's land is categorised as agricultural land, and land use for sugarcane is about 460 000 hectares mainly in the Kwa-Zulu Natal region (Maher, 2016). According to Crane (2006) just over 30% of the Cape Floral Kingdom has been transformed due to agriculture and forestry, and in Kwa-Zulu Natal 7.6% of natural habitat was lost between 2005 and 2011 mainly due to agriculture and plantations, as well as expansion of built up areas (Jewitt *et al.*, 2015). Other environmental impacts in the agricultural sector with consequences for biodiversity are soil erosion, increased nutrient load to fresh water bodies, pesticide use, over-grazing and promoting large areas with single plant species (corn, rice, potato, soy beans etc.). The South African sugar industry is associated with biodiversity issues related to water availability and quality, soil quality and erosion of land prepared for sugar cane planting (World Wild Fund for Nature (WWF), 2016), as well as a low level of biodiversity (Maher, 2016). According to WWF (2015) many of the pesticides used in South Africa are banned in other countries due to their harm to the environment, wildlife and human beings.

South Africa is a mining nation with a history of mining for gold and other precious metals. Coal mining is extensively practiced as a source of fossil fuel. Some of these coalmines are among the largest in the world, and half of them are opencast mines (Department of Energy, 2016). Opencast mining causes biodiversity impacts through the clearing of larger land areas with damages to the natural vegetation and topsoil as a consequence (Dontala *et al.*, 2015). Another key biodiversity impact stems from mining waste. Already in 1987 the US Environmental Protection Agency (EPA) recognised that the mining waste had large detrimental effect on ecosystems, considering it second to the effects of climate change and ozone depletion (Durand, 2012). The mining sector in South Africa has caused significant impacts to freshwater biodiversity due to acid mine

drainage, reduced water flows and water leaks from mines into nearby water bodies. The severe macroscopic biodiversity loss in 2011 due to mine wastes in Tweelopiespruit and Rietspruit in Gauteng is an example of biodiversity impacts due to the mining sector in South Africa (Durand, 2012).

3. Methodology

The aim of this study was to identify and analyse biodiversity management practices among a selection of South African companies within industries known for their biodiversity challenges, and to identify available biodiversity management support material and its application.

The research design was iterative in form, and took an explorative approach based on secondary data complemented by in-depth questionnaires. It was a cross-sectional comparison investigating corporate biodiversity management practices in the forestry, sugar and mining sector. This design was chosen as it allowed for a deeper understanding of the current context, complexities and challenges in applying biodiversity management practices in the forestry, sugar and mining industries. The process steps taken to achieve the research objectives were:

1. identification of suitable companies to be studied;
2. collation of secondary data, annual reports, sustainability reports and web page content;
3. preliminary analysis of secondary data;
4. complementary data collection through company interviews;
5. qualitative data analysis of the assessment.

Explorative research design is not intended to identify conclusive results, and the research would not have statistical strength. A key strength with this research approach is its flexibility in form, and that it may develop a solid knowledge foundation for future research framing and development (University of Southern California, 2016).

The target population for the study included corporate sustainability leaders in the South African forestry, sugar and mining industries listed on the Johannesburg Stock Exchange. Sustainability leaders were defined as constituents of the Socially Responsible Investment Index 2014, which included 23 companies in the studied sectors. The index did not have an update for 2015, so the research made use of the 2014 list of companies. The sample selection was further restricted to companies in the forestry, sugar and mining sectors who are members of National Business Initiative (NBI). The NBI membership was applied as a selection criterion in order to identify a study group with the likelihood of a

greater awareness of corporate sustainability aspects. The sugar and forestry industries were likely to have companies of size and complexity that are comparable to the mining sector, and were specifically chosen as opposed to the whole of the agricultural sector. The selection excluded holding companies in order to look at companies with a high South African context and relevance, and to avoid comparing companies with similar ownership structures.

The selection criteria aimed to reduce the sample to 10-15 companies for comparison with a maximum of five companies per industry. The above criteria reduced the sample size for forestry and sugar companies to two companies per sector, and there were no further selection criteria applied. For the mining sector, the preliminary selection resulted in 14 companies remaining in the selection. Five companies from this selection were therefore chosen by simple random sampling. Final sample size was nine companies, and a summary of the sampling process is found in Table 3.1.

TABLE 3.1 SAMPLE SELECTION

	Forestry	Sugar	Mining
Target Population	2	2	19
NBI member	2	2	14
Final Sample Size	2	2	5

The data collection was based on the following approach:

1. Online research:

   Through the use of search engines, as well as direct search of specific websites, a range of biodiversity management recommendations, guidelines and tools relevant for the mining, forestry and sugar industries were collated. Annual reports of South African finance institutions committing to the Equator Principles (three companies) were also reviewed for information on application of IFC Performance standards.

2. Review of published company documentation:

   The documents reviewed included among others annual reporting documentation from 2014 and 2015, company statements, charters, relevant policies and standards. The data were captured in an excel database structured according to a data assessment framework (see section 3.1).

3. Review of website content:

   The company websites were reviewed for statements on sustainability, environmental and biodiversity management, lender requirements, as well as governance structure and risk management. The data were integrated in the excel database in accordance with a data assessment framework (see section 3.1).

4. Semi-structured interviews with company representatives:

   The data collection tool was a semi-structured questionnaire (Appendices 2 and 3). A general questionnaire structure was developed according to the data assessment framework (see section 3.1), and adapted based on information collected through secondary data resources. A transcript was generated per interview. The questionnaire targeted company positions such as Sustainability Manager, Environmental Manager or equivalent, while the actual respondent of the questionnaire was at the company's discretion.

The primary data collection protocols were prepared in accordance with the University of the Witwatersrand's Human (non-medical) Ethics Committee guidelines and interviews were only conducted once company, interviewee and university approvals were obtained (H16/05/13). Only two companies were interviewed as the remaining selected companies declined to participate.

The data analysis was qualitative in form, and based on the grounded theory (Glaser & Strauss, 1967). The research studied the concept of biodiversity management, and aimed to discover emerging patterns in the data. The data were organised according to a data assessment framework, which is presented in section 3.1 below.

3.1 Data Assessment Framework

The data assessment methodology for research objective three was based on a set of management metrics that was combined with a scoring mechanism. The development of the assessment metrics was adapted from elements of an environmental management system (EMS). Furthermore, the biodiversity management tools outlined by Schaltegger & Bestandig (2012) in the Corporate

Biodiversity Management Handbook and the tools and processes outlined in the Biodiversity Management System report by IUCN-Holcim Independent Expert Panel (2010) supported the development of the metrics. The data assessment framework is outlined in Table 3.2. Three of the assessment metrics defined were scored according to their detailed approach to biodiversity. These metrics were:

- “Biodiversity in sustainability governance structure”,
- “Biodiversity in supplier requirements”, and
- “Biodiversity in sustainability reporting”

General scoring definitions applicable across the biodiversity management metrics were not practically feasible due to the inherent differences between the management metrics. Therefore a definition per metric was developed. The scoring methodology is reflected in Table 3.3 below. The Procter and Gamble (P&G) environmental sustainability scorecard for suppliers (P&G, 2015) informed the scorecard development, as well as the GRI (2015) on biodiversity reporting metrics and the Deloitte & Touché sustainability scorecard (Deloitte Touché Tohmatsu, 2006).

There were no statistical analyses performed due to the low sample size. The study rather aimed at identifying similarities and differences aiming to identify potential trends within the studied sample.

TABLE 3.2 DATA ASSESMENT FRAMEWORK (IUCN-HOLCIM INDEPENDENT EXPERT PANEL, 2010; SCHALTEGGER & BESTANDIG, 2012; GRI, 2015)

Metric	Explanation	Assessment	Aspects Reviewed
Biodiversity in business principles and values	Demonstrates company culture and ethical values with regards to the environment and biodiversity conservation.	Qualitative assessment without scoring mechanism	Identified company documentation and statements on: - Code of Conduct / Code of Business Ethics - Company commitments and value statement Reviewed for inclusion of sustainability, environmental and/or biodiversity considerations.
Biodiversity in sustainability governance structure	Demonstrate company framework, policies and standards on biodiversity management	Qualitative assessment with scoring mechanism	Identified company documentation and statements on Sustainability, Environmental and/or Biodiversity: - strategies, policies, standards and guidelines Reviewed for inclusion of biodiversity considerations.
Biodiversity and lender requirements	Identify relevance and importance of lender requirements on biodiversity management	Qualitative assessment without scoring mechanism	Identified and reviewed company statements on external funding and compliance in annual reporting and on website. Identified and reviewed statements on IFC performance standard application by South African finance institutions having signed up to Equator Principles.
Biodiversity in risk and impact assessments	Demonstrate company awareness of potential and actual biodiversity risks, impacts and opportunities; Biodiversity Risk Matrix and Biodiversity Mitigation Hierarchy	Qualitative assessment without scoring mechanism	Identified company risk management structure, and review for inclusion of sustainability, environmental and/or biodiversity considerations. Reviewed company identification of key impacts and risks in annual report, and verify inclusion of sustainability, environmental and/or biodiversity considerations.
Biodiversity management tools	Demonstrate company efforts to identify, assess and mitigate potential biodiversity impacts through the use of specialised tools such as spatial assessment tools, land use planning tools, biodiversity mitigation hierarchy, Biodiversity Action Plans etc.	Qualitative assessment without scoring mechanism	Identified the use of biodiversity management tools (such as GIS mapping and other spatial assessment tools, biodiversity action plans, land use planning tools, WET Health tools etc.), and review the use of biodiversity tools cross sectors.
Biodiversity in supplier requirements	Demonstrate company's willingness to pay for products and services of better environmental performance.	Qualitative assessment with scoring mechanism	Identified company documentation and statements on: - Supplier Code of Conduct - Supplier Policy and/or Standards - Procurement Policy - Material Stewardship & Supply Chain Policy - Supplier Assessment Processes

Metric	Explanation	Assessment	Aspects Reviewed
			- Sourcing Strategies Reviewed for inclusion of sustainability, environmental and/or biodiversity considerations. Reviewed section on suppliers in annual reporting to identify specific focus areas, key concerns and emphasis.
Biodiversity in sustainability reporting	Demonstrates company's public commitment and transparency to managing biodiversity impacts.	Qualitative assessment with scoring mechanism	Reviewed compliance with GRI G4 metrics, and the level of information provided: - G4-DMA (generic on disclosure) - why Biodiversity is important and how impacts are managed, and an evaluation of the management approach - G4-EN11 - Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas (for each operational site owned, leased, managed) - G4-EN12 - Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas (species affected, habitat conversion etc.) - G4-EN13 - Habitats protected or restored (location, size, status) - G4-EN14 - Total number of IUCN Red List species and national conservation list species with habitats in areas affected by operations, by level of extinction risk - G4-EN26 Identity, Size, Protected Status, and Biodiversity Value of Water Bodies and Related Habitats Significantly Affected by the Organisation's Discharges Specific mining metrics have not been included, as these are not applicable to other sectors.
Biodiversity in stakeholder engagement	Demonstrate company's consideration of stakeholder	Qualitative assessment without scoring mechanism	Identified documentation and statements on: - Biodiversity related partnership with academic and/or local groups - Stakeholders engaged with annually with relevance to biodiversity stewardship
Biodiversity in benchmarking exercises	Demonstrate company's interest in improving their biodiversity management performance	Qualitative assessment without scoring mechanism	Identified documentation and statements on: - Regularity of benchmarking exercises - Content of benchmarking exercises Reviewed for inclusion of sustainability, environmental and/or biodiversity aspects in the benchmarking exercise.
Biodiversity and decision making	Demonstrate practical examples of company initiative and management of biodiversity issues.	Qualitative assessment without scoring mechanism	Identified and reviewed statements on: - practical implementation examples - results and changes due to partnerships and collaborations

TABLE 3.3 ASSESSMENT SCORECARD (DELOITTE & TOUCHE, 2006; P&G, 2015)

	Rating	Scoring Definition	Additional Explanation for Biodiversity in Sustainability Governance Structure	Additional Explanation for Biodiversity in Sustainability Reporting	Additional explanation for Biodiversity in Supplier Requirements
1	Far below expectations	There is insufficient attention biodiversity.	There is no evidence of a documented biodiversity strategy, policy or standard. There is no reference to biodiversity in sustainability or environmental strategies, policies or standards, or these policies could not be confirmed.	No mention or barely mentioned biodiversity (<4 times mentioned). None of the GRI-G4 biodiversity related metrics reported (G4-DMA, G4-EN11, G4-EN12, G4-EN13, G4-EN14, G4-EN26). Examples of biodiversity management in practice not included.	There is no evidence of documented biodiversity requirements, or supplier requirements and documentation could not be confirmed.
2	Below expectations	There is minor attention to biodiversity.	There is no evidence of a documented biodiversity policy or standard. There is reference to strategies for biodiversity management or biodiversity guidance material. There is reference to biodiversity in sustainability or environmental strategies, policies or standards.	Some mention of biodiversity (mentioned 4 times or more, but less than 1/2 page on biodiversity all together). Did not report as recommended by GRI G4. One or two of the GRI-G4 biodiversity related metrics reported (G4-DMA, G4-EN11, G4-EN12, G4-EN13, G4-EN14, G4-EN26), while the metrics may be partly reported or contain considerable information gap. Examples of biodiversity management in practice barely mentioned	There is an indirect or high-level statement in supplier documentation and requirements on biodiversity management. There is a reference to environmental management systems and/or certification programmes.
3	Meets expectations	There is attention to biodiversity management.	Biodiversity included, detailed and thought through either in sustainability or environmental policies. There is a biodiversity or equivalent policy or standard in use.	Both qualitative and quantitative information presented. Most important biodiversity aspects covered. Three to five of the biodiversity metrics recommended by GRI G4 included (G4-DMA, G4-EN11, G4-EN12, G4-EN13, G4-EN14, G4-EN26), while the metrics may be partly reported or contain considerable information gap. Examples of biodiversity management in practice included.	There is an elaborate statement on biodiversity management requirements for suppliers.

	Rating	Scoring Definition	Additional Explanation for Biodiversity in Sustainability Governance Structure	Additional Explanation for Biodiversity in Sustainability Reporting	Additional explanation for Biodiversity in Supplier Requirements
4	Exceeds expectations	There is a strong attention to biodiversity management.	Biodiversity is integrated in management systems and processes. Company demonstrates a high degree of incorporation of biodiversity guidelines and best practice. There is dedicated biodiversity policy(ies) and/or standards, or equivalent policy/standard in place.	Biodiversity is extensively discussed in the annual reporting, including key impacts and management approaches to biodiversity impacts. Four to five biodiversity metrics recommended by GRI G4 included (G4-DMA, G4-EN11, G4-EN12, G4-EN13, G4-EN14, G4-EN26), where a few metrics are reported on fully, and there are no significant information gaps in the metrics reported. Recent examples of biodiversity management in practice included. Evidence of engaging externally and/or collaborating with external organisations on biodiversity related matters. Confirms elements of biodiversity management framework in place.	There are detailed operational and minimum biodiversity requirements for suppliers.
5	Far exceeds expectations	There is a very strong attention to biodiversity management.	Company has developed several biodiversity policies addressing specific concerns and impacts, as well as guidelines and best practice. Company demonstrate new ideas and approaches (in their policy development).	Biodiversity is extensively discussed in the annual reporting, including key impacts and management approaches to biodiversity impacts. All relevant biodiversity metrics recommended by GRI G4 included (G4-DMA, G4-EN11, G4-EN12, G4-EN13, G4-EN14, G4-EN26), where >3 metrics are reported on fully with no information gaps. Examples of biodiversity management in practice elaborated including examples of specific initiatives from the reporting year. Examples of engaging externally and/or collaborating with external organisations on biodiversity related matters. Confirms a dedicated biodiversity management framework in place.	There are detailed operational and minimum requirements with regards to biodiversity management for supplier requirements that demonstrates implementation of global best practices.

3.2 GRI G4 Biodiversity Metrics

To further explain the assessment of the sustainability reporting metric (see Table 3.2), the defined metrics for biodiversity as recommended by GRI have been included below. The text is quoted from the Guideline: G4 Sustainability Reporting Guidelines (GRI, 2013 p.8 – p. 61).

G4-DMA - DISCLOSURE ON MANAGEMENT APPROACH (GRI, 2013, p. 8)
The report should cover DMA and Indicators for identified material aspects.

G4-EN11 OPERATIONAL SITES OWNED, LEASED, MANAGED IN, OR ADJACENT TO, PROTECTED AREAS AND AREAS OF HIGH BIODIVERSITY VALUE OUTSIDE PROTECTED AREAS (GRI, 2013, p.55)
a. Report the following information for each operational site owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas:

- Geographic location
- Subsurface and underground land that may be owned, leased, or managed by the organisation
- Position in relation to the protected area (in the area, adjacent to, or containing portions of the protected area) or the high biodiversity value area outside protected areas
- Type of operation (office, manufacturing or production, or extractive)
- Size of operational site in km2
- Biodiversity value characterised by:
    - The attribute of the protected area or high biodiversity value area outside the protected area (terrestrial, freshwater, or maritime ecosystem)
    - Listing of protected status (such as IUCN Protected Area Management Categories, Ramsar Convention, national legislation)

G4-EN12 DESCRIPTION OF SIGNIFICANT IMPACTS OF ACTIVITIES, PRODUCTS, AND SERVICES ON BIODIVERSITY IN PROTECTED AREAS AND AREAS OF HIGH BIODIVERSITY VALUE OUTSIDE PROTECTED AREAS (GRI, 2013, p. 56)
A. Report the nature of significant direct and indirect impacts on biodiversity with reference to one or more of the following:
    - Construction or use of manufacturing plants, mines, and transport infrastructure
    - Pollution (introduction of substances that do not naturally occur in the habitat from point and non-point sources)
    - Introduction of invasive species, pests, and pathogens
    - Reduction of species

- Habitat conversion
- Changes in ecological processes outside the natural range of variation (such as salinity or changes in groundwater level)

B. Report significant direct and indirect positive and negative impacts with reference to the following:
   - Species affected
   - Extent of areas impacted
   - Duration of impacts
   - Reversibility or irreversibility of the impacts

G4-EN13 HABITATS PROTECTED OR RESTORED (GRI, 2013, p. 56)

A. Report the size and location of all habitat protected areas or restored areas, and whether the success of the restoration measure was or is approved by independent external professionals.
B. Report whether partnerships exist with third parties to protect or restore habitat areas distinct from where the organisation has overseen and implemented restoration or protection measures.
C. Report on the status of each area based on its condition at the close of the reporting period.
D. Report standards, methodologies, and assumptions used.

G4-EN14 TOTAL NUMBER OF IUCN RED LIST SPECIES AND NATIONAL CONSERVATION LIST SPECIES WITH HABITATS IN AREAS AFFECTED BY OPERATIONS, BY LEVEL OF EXTINCTION RISK (GRI, 2013, p. 56)

A. Report the total number of IUCN Red List species and national conservation list species with habitats in areas affected by the operations of the organisation, by level of extinction risk:
   - Critically endangered
   - Endangered
   - Vulnerable
   - Near threatened Least concern

G4-EN26 IDENTITY, SIZE, PROTECTED STATUS, AND BIODIVERSITY VALUE OF WATER BODIES AND RELATED HABITATS SIGNIFICANTLY AFFECTED BY THE ORGANISATION'S DISCHARGES OF WATER AND RUNOFF (GRI, 2013, p. 61)

A. Report water bodies and related habitats that are significantly affected by water discharges based on the criteria described in the Compilation section below, adding information on:
   - Size of water body and related habitat

- Whether the water body and related habitat is designated as a protected area (nationally or internationally)
- Biodiversity value (such as total number of protected species)

3.1 Research Limitations

Target population for the study was JSE listed companies featuring on the Socially Responsible Investment Index 2014. However, there are smaller companies in South Africa demonstrating good practice in terms of biodiversity management, which would not be listed on the JSE. The defined target population therefore excluded certain companies with good practice biodiversity management in the relevant sectors. Albeit existing criticism of the JSE SRI index, the target population chosen was deemed the most appropriate for this study as companies listed on the SRI index were expected to be more detailed in their annual reporting. This is mainly due to the index requirements promoting better sustainability reporting and governance (Sonnenberg & Hamann, 2006; Maubane *et al.*, 2014;).

Data collection relied to a large extent on public resources and documentation. According to the legitimacy theory, a company with poor performance may be incentivised towards extensive disclosure in order to improve its public image (Hummel & Schlick, 2016). This tendency would negatively affect the interpretation of the data collected. However, the study by Hummel & Schlick (2016) found that companies with better sustainability performance would tend to have a better quality of its disclosure, as opposed to a mere increased quantity of disclosure. Therefore neither of the theories (voluntary disclosure and legitimacy theory) were rejected or concluded as contradictory. This study relied on the principle that the secondary data collected would be sufficiently correct to representative of the companies' performance. However, a quality related challenge related to the tendency of developing global annual reports, which means the data were difficult to extrapolate to a local level and context.

Research design was qualitative in form, which meant the sample size was not sufficiently large for statistically testing. To account for this, results were compared to those obtained in other surveys of South African companies with regards to biodiversity management.

Despite of these research limitations, the approach chosen was deemed appropriate to compare the three sectors and identify potential sectorial differences and best practices for biodiversity management.

4. Results

4.1 Biodiversity Guidelines and Best Practice

The ethical and sustainability guidelines most frequently referred to by the studied companies were the UN Global Compact Principles, as well as the King III Principles. The UN Global Compact Principles are voluntary commitments, whilst compliance to the King III Principles is required by all JSE listed companies (JSE, 2016a). Eight out of the nine companies confirmed the adherence to UN Global Compact Principles. In addition, two of the companies also made reference to the UN Sustainable Development Goals and/or the Millennium Development Goals. For specific biodiversity related guidelines, the Mining and Biodiversity Guidelines were the most frequently mentioned, referred to by all of the five studied companies in the mining sector. Other guidelines mentioned were:

- Guidelines for Delineating Boundaries of a Wetland (Department for Water Affairs and Forestry (DWAF)), and
- Wetland Management series (Water Research Commission (WRC)).

During the interview with a mining company they referred to the ICMM guidelines on Good Practice as well as the Biodiversity and Mining Guidelines as the most useful guidelines for their operations in South Africa, whilst also confirming the applicability of IPIECA guidelines and recommendations. An interesting observation was that one company interviewed mentioned SANBI guidelines as being very useful, whilst others had never found any need for SANBI guidance and recommendations.
The most frequently mentioned organisations providing companies with biodiversity guidelines, tools and best practice recommendations on biodiversity management were identified as

1. The IUCN - mainly due to the IUCN Red List of Threatened Species which is referenced in GRI reporting metric G4-EN14;
2. The ICMM – mainly due to mining companies confirming compliance with the 10 principles on sustainable development;
3. WWF – mainly in the context of local initiatives and/or partnerships with regards to biodiversity management.

Furthermore, there were few other references made to IUCN guidelines other than the red list, and the IUCN water related guidelines. The mining company interviewed was aware of several IUCN guidelines, but was not acquainted with the biodiversity best practice documentation for the cement industry. The documentation was built on a collaboration with a cement company (Holcim) that also operates a number of quarries supplying their cement production. The guidelines were therefore expected to be of relevance to the mining sector. The sugar company interviewed was not familiar

with IUCN guidelines on biodiversity. There were several other organisations mentioned less frequently, which have been included in Table 4.1 below.

TABLE 4.1 ASSOCIATIONS ISSUING BIODIVERSITY BEST PRACTICE RECOMMENDATIONS MENTIONED BY THE STUDIED COMPANIES

	Forestry Comp. 1	Forestry Comp. 2	Sugar Comp. 1	Sugar Comp. 2	Mining Comp. 1	Mining Comp. 2	Mining Comp. 3	Mining Comp. 4	Mining Comp. 4	Mentions
IUCN	No	**Yes**	**Yes**	No	**Yes**	No	**Yes**	No	No	4
BBOP	No	No	No	No	No	No	No	No	No	0
WBSDC	No	**Yes**	No	No	No	No	No	No	No	1
ICMM	N/A	N/A	N/A	N/A	**Yes**	No	**Yes**	**Yes**	No	3
IPIECA	N/A	N/A	N/A	N/A	No	No	No	**Yes**	No	
WWF (SA)	**Yes**	**Yes**	No	No	No	No	No	No	**Yes**	3
SANBI	**Yes**	No	No	No	No	No	No	**Yes**	**Yes**	3
ICFR	**Yes**	**Yes**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2
FSA	**Yes**	**Yes**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2
TFD	**Yes**	**Yes**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
HCVRN	-	**Yes**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
SASRI	N/A	N/A	**Yes**	**Yes**	N/A	N/A	N/A	N/A	N/A	1

Generally, the impression was that the ICMM had a strong influential role in terms of driving best practice in the mining sector. Similar sectorial associations for the forestry and sugar industry with equal clout and influence was not identified to the same extent. Both the sugar and forestry sectors seemed to focus on sectorial sustainability and biodiversity guidance through certification programmes like FSC, PEFC, BonSucro and SusFarMS. Both the forestry companies confirmed that FSC certification was in place, whilst only one of the sugar companies confirmed compliance and certification with the SusFarMS. The second sugar company confirmed in the interview that they were familiar with SusFarMS although they were not certified. The company believed they were fairly aligned but did not necessarily see the need for a certification assurance.

National Business and Biodiversity Network (NBBN) confirmed that a cross-sector biodiversity mainstreaming toolkit could be useful for South African companies. The organisation is currently working to see if there is appetite and funding for such a support mechanism.

The overview of biodiversity guidelines (Appendix 1) was discussed during the two company interviews. The discussions revealed a general awareness of the guidelines, whilst that would not necessarily have had an implication for the management framework. There were no additional guidelines and best practice materials identified during the company interviews. A key feedback from the interviewed mining company was the lack of clarity and guidance on the implementation of the No Net Loss Concept. This concept was seen as difficult to measure, and they have found no clear guidance on how this concept can be implemented on site level.

4.2 Corporate Biodiversity Management Practices

Biodiversity in Values and Principles

Most companies assessed included sustainability and/or environmental high-level statements in their expression of values and principles. Biodiversity did not form part of their code of ethics, whilst just under 50% of the companies integrated biodiversity in specific sustainability commitments and values.

The studied companies had somewhat different approaches to documenting their values and principles, whilst in most cases there was a code of (business) ethics or a code of conduct. Company value statements (separate to the company's ethical codes) were publicly provided by four of the nine companies. Only one of the four companies did not include sustainability or environmental considerations in their value statement. Table 4.2 summarises the key results from reviewing the company code of (business) ethics and/or code of conduct.

TABLE 4.2 BIODIVERSITY IN VALUES AND PRINCIPLES

	Code of Ethics		**Code of Business Conduct**		**Other**
	Environment/ Sustainability	Biodiversity	Environment/ Sustainability	Biodiversity	
For. Comp. 1	Yes	No	-	-	Group Sustainability Charter
For. Comp. 1	No information as to the use of these codes				Global Sustainability 5-year Commitments
Sugar Comp. 1	-	-	Yes	No	
Sugar Comp. 2	-	-	Yes	No	
Mining Comp. 1	Yes	No	-	-	
Mining Comp. 2	Codes not found				

Mining Comp. 3	-	-	Yes	No	Commitment Charter – Zero Harm to Environment
Mining Comp. 4	Yes	No	-	-	Sustainability Statement, Environmental Statement
Mining Comp. 5	Codes not found				

Good practice on incorporating biodiversity in values and principles was identified for the two forestry companies and two mining company. One of the forestry companies made use of a corporate sustainability charter referencing reduction in water consumption, mitigation of impacts on biodiversity and promotion of sustainable forestry. The second forestry company published its overall 5-year commitments that included biodiversity considerations (albeit with non-measurable Key Performance Indicators (KPI)). The annual reporting included a discussion on actions taken on these commitments. One of the mining companies made use of a sustainability statement and an environmental statement, which seemed similar in approach to that of the sustainability charter developed by the forestry company. The second mining company made a bold commitment to zero harm to the environment through their company commitment charter, which could be interpreted as a No Net Loss commitment. However, the zero harm statement was not followed up with explanations on concrete interpretation, actions and progress made against this commitment.

Biodiversity in Sustainability Governance Structure

Less than half of the studied companies would have dedicated biodiversity management documentation in place such as a biodiversity strategy, policy or standard. Generally, the mining companies seemed to have a stronger focus on developing dedicated biodiversity management documentation compared to the other sectors. Furthermore, most of the companies would have biodiversity considerations included in their sustainability and/or environmental policy. The detail and consistency in integrating biodiversity in company framework scored relatively low with over half of the companies being scored as below expectations.

The study scored and analysed the presence of a corporate biodiversity management framework, which is presented in Table 4.3. The general scores for the sample are relatively low with over half of the companies scoring below expectations.

TABLE 4.3 SCORING ASSESSMENT FOR BIODIVERSITY IN SUSTAINABILITY GOVERNANCE STRUCTURE

Biodiversity in Sustainability Governance Structure (policies, standards, guides)										
	Rating	Forestry Comp 1	Forestry Comp 2	Sugar Comp 1	Sugar Comp 2	Mining Comp 1	Mining Comp 2	Mining Comp 3	Mining Comp 4	Mining Comp 5
1	Far below expectations				1					

Biodiversity in Sustainability Governance Structure (policies, standards, guides)										
	Rating	Forestry Comp 1	Forestry Comp 2	Sugar Comp 1	Sugar Comp 2	Mining Comp 1	Mining Comp 2	Mining Comp 3	Mining Comp 4	Mining Comp 5
2	Below expectations	2		2		2	2		2	
3	Meets expectations							3		
4	Exceeds expectations		4							
5	Far exceeds expectations									5
Note: The sample median score was 2 (below expectations)										

One of the studied mining companies scored 5 (far exceeds expectations) due to the company confirming the development and/or presence of several dedicated biodiversity policies and standards (i.e. biodiversity policy, biodiversity offset policy and wetlands policy). Two of these policies were in draft stage, but they were considered in the scoring assessment.

Detailed biodiversity management framework elements forming part of the above scoring assessment have been summarised in Table 4.4. The table is included to provide a more detailed view of the biodiversity framework elements deployed by the studied companies.

TABLE 4.4 BIODIVERSITY MANAGEMENT FRAMEWORK

	Sustainability Policy - Biodiversity Included	**Environmental Policy** - Biodiversity Included	**Biodiversity Strategy, Policy or Standard**
Forest Company 1	-	Yes	
Forest Company 2	Yes	-	Standard for Sustainable Forestry
Sugar Company 1	Yes	-	Biodiversity Management Strategy
Sugar Company 2	Policies Not Available For Review. Sustainability Strategy Not Approved.		Sustainability and environment incorporated in annual business plan
Mining Company 1	-	Yes	Strategies to manage biodiversity, whilst not specified.
Mining Company 2	-	Yes	
Mining Company 3	Yes	-	Land use and biodiversity standard
Mining Company 4	Yes	Yes	Biodiversity guide
Mining Company 5	Policies Not Available For Review		Biodiversity policy, standard and other biodiversity relevant policies in draft.

Seven of the nine studied companies had a Sustainability Policy and/or an Environmental Policy incorporating biodiversity considerations. The biodiversity statements included in sustainability and/or environmental policies tended to be more high level and general, as opposed to specific operational requirements. There were three mining companies and one sugar company confirming the use of dedicated biodiversity management documentation. None of the dedicated biodiversity

policies, strategies and standards were shared publicly. The sustainable forestry standard included biodiversity considerations. It made reference to long-term ecological functioning of ecosystems and the integrity of high conservation values in and nearby managed land. The standard also required the development of an Ecosystem and Biodiversity Plan where operations have significant impacts to ecosystem and biodiversity. Three of the mining companies confirmed a biodiversity action plan in place for all or most of their assets, which may be an indicator that this is a company requirement in several of the assessed companies.

Lender Requirements on Biodiversity Management

The study identified some level of influence on sustainability performance through lender institutions with some influence from the IFC standards. The study identified an example of where the lender institution included biodiversity considerations in their follow-up with a borrowing organisation. This demonstrated that mechanisms were in place at the lender institutions for ensuring biodiversity management performance, whilst the effectiveness of the mechanism seemed to have room for improvement.

Three of the mining companies made reference to the IFC performance standards, whilst there was no specific reference to the performance standard on biodiversity. An interview with one of the sugar companies confirmed that they received additional requirements from the lending institutions, but they were not aware of whether these were derived from the Equator Principles and IFC Performance standards. The finance institution would provide the company with a self-assessment checklist on environmental and social management aspects that included considerations for biodiversity. This assurance process had so far not been followed up with on-site audits by the finance institution, and was therefore very much dependent on the integrity of the company performing the self-assessment.

The review of the annual reports of South African finance institutions signed up to the Equator Principles confirmed their commitment to applying the IFC performance standards. One of the finance institutions made the following statement from their sustainability report "…*reviews all potential project finance transactions for environmental and social compliance with the Equator Principles, IFC Performance standards and legislation.*" The second finance institution made the following specific statement with regards to biodiversity management "*Biodiversity considerations are included as part of our environmental and social appraisal process and are also addressed in the detailed due diligence. The appraisal considerations are in line with the International Finance Corporation's (IFC's) Performance Standards, including aspects such as ecosystems, critical habitats, legally protected areas and invasive alien species.*"

Biodiversity in Risk and Impact Assessments

The study showed that less than half of the studied companies recognised biodiversity as a material issue in their annual reporting from 2015 regardless of sector. The study did not identify specific methodologies applied by the companies to identify biodiversity risks and impacts, and the use of a dedicated biodiversity risk matrix was not confirmed. The mining companies referred to the biodiversity mitigation hierarchy directly, and confirmed compliance with the Mining and Biodiversity Guidelines (includes a biodiversity mitigation hierarchy).

The assessed companies confirmed the presence of a risk management system or an Enterprise Risk Management System, and two of the companies confirmed compliance with ISO31000. This indicates a structured system in place for dealing with risks, however it does not necessarily guarantee that sustainability, environmental and/or biodiversity risks are adequately reflected in these corporate risk systems. Key findings with regards to incorporating biodiversity in risk and impact management include:

- four companies confirmed an integrated risk management system in place;
- one company confirmed a sustainable risk register in place;
- three companies listed biodiversity as a material issue in their annual reporting, and
- one company confirmed the integration of biodiversity risks in operational risk registers.

Table 4.5 summarises the companies' approach to managing risks, and incorporating biodiversity in company risk management systems.

TABLE 4.5 BIODIVERSITY IN RISK AND IMPACT ASSESSMENTS

	Risk Mgt System	Integrated Risk Mgt System	Top risks listed in annual reporting	Top risk: sustainability / biodiversity	Material issues listed in annual reporting	Material issue: Sustainability of production/ supply	Material issue: Impact management	Material issue: Biodiversity
For. Comp. 1	Yes				Yes	Yes		
For. Comp. 2	Yes	Yes			Yes			
Sug. Comp. 1	Yes	Yes	Yes					
Sug. Comp. 2	Yes	Yes						Yes
Min. Comp. 1	Yes		Yes		Yes		Yes	
Min. Comp. 2	Yes				Yes			
Min. Comp. 3	Yes				Yes		Yes	Yes
Min. Comp. 4	Yes		Yes		Yes			Yes
Min. Comp. 5	Yes	Yes			Yes			

Interestingly four of the studied companies reported impact management and/or biodiversity as a material issue for the company. However this did not necessarily translate into becoming a strategic focus area, as most of the studied companies did not include biodiversity in the reported key focus areas or strategic objectives. Having said that, a few of the studied companies outlined specific biodiversity related objectives as part of their environmental agenda, and as previously mentioned one company included biodiversity in their 5-yearly commitments.

Biodiversity Management Tools

The primary explicit biodiversity management tool mentioned was Biodiversity Action Plans (BAP) or equivalent. However, there was little information with regards to their reasons for developing a BAP, and there were no publicly shared examples of Biodiversity Action Plans. The studied companies confirmed the use of various other management tools with relevance for biodiversity management:

- all of the companies confirmed ISO 14001 certification in place,
- three companies confirmed the use of GIS mapping of biodiversity sensitive areas, water and wetlands areas and other biodiversity relevant information, and
- two companies confirmed the use of Wet-Health tools by WRC.

Table 4.6 below summarises the tools referenced by the studied companies.

TABLE 4.6 BIODIVERSITY MANAGEMENT TOOLS (NUMBER INDICATES THE NUMBER OF COMPANIES CONFIRMING THE USE OF THE INDICATED BIODIVERSITY MANAGEMENT TOOL)

Management Tool	Forestry Sector	Sugar Industry	Mining Sector
ISO 14001	2	2	5
FSC	2	N/A	N/A
SusFarMS	N/A	1	N/A
Ecosystem Management Plan	1	0	0
Biodiversity Action Plan	0	1	4
Land Use Plan	0	1	0
(Integrated) GIS Data System	2	0	1
Wet-Health (WRC)	1	0	1
Integrated Biodiversity Assessment Tool (IBAT)	1	0	0
Eco-sensitive harvesting plans	1	0	N/A
Wetlands National Classification System (SANBI)	0	0	1
Ecological Importance & Sensitivity Assessment (DWAF)	0	0	1
WET EcoServices, Effective Manage Tools, Method Tools, Rehab Evaluate Tools	0	0	1

Management Tool	Forestry Sector	Sugar Industry	Mining Sector
Wetland Index for Habitat Integrity (Wetland-IHI)	0	0	1

Several of the studied companies confirmed that the BAP would be integrated in the Environmental Management Plan (EMP) and/or Mine Closure Plan, as opposed to having a stand-alone biodiversity action plan.

There were few tools mentioned across all sectors with the exception of ISO 14001, Biodiversity Action Plans, Geographic Information System (GIS) mapping and Wet-Health. Biodiversity management concepts such as No Net Loss or Net Positive Impact were only mentioned by one mining company making the following statement "*where feasible, we aim to have a net positive impact on biodiversity*". However, the company made no further description or explanations as to how they work towards achieving this goal, nor whether this has been possible to achieve.

Biodiversity in Supplier Requirements

The scores for supply chain management were poor with more than half of the companies scoring below expectations, and several scoring far below expectations (Table 14). The forestry companies seemed to have a stronger focus on environmental sustainability and biodiversity in their supply chain management, while the sugar companies seemed to focus more on human rights and child labour. The mining companies seemed to focus on local content and Black Economic Empowerment (BEE) in their supply chain management. The mining companies also had a more process-oriented set of supplier requirements as opposed to specific minimum performance standards (such as not converting natural forests to plantations). The interview with the mining company confirmed a strong focus on people's issues in the supply chain such as corruption, fair wages, human rights and child labour as opposed to specific environmental concerns such as biodiversity. The sugar company interviewed emphasised that a key part of their supply chain management was reviewing farming practices, pesticide application and wealth distribution. One of the forestry companies confirmed a focus on legal aspects where the key issues link back to water licenses.

TABLE 4.7 SCORING ASSESSMENT FOR BIODIVERSITY IN SUPPLIER REQUIREMENTS

Biodiversity in Supplier Requirements										
	Rating	Forestry Comp 1	Forestry Comp 2	Sugar Comp 1	Sugar Comp 2	Mining Comp 1	Mining Comp 2	Mining Comp 3	Mining Comp 4	Mining Comp 5
1	Far below expectations				1	1	1			
2	Below expectations		2	2				2	2	2

Biodiversity in Supplier Requirements										
	Rating	Forestry Comp 1	Forestry Comp 2	Sugar Comp 1	Sugar Comp 2	Mining Comp 1	Mining Comp 2	Mining Comp 3	Mining Comp 4	Mining Comp 5
3	Meets expectations									
4	Exceeds expectations	4								
5	Far exceeds expectations									
Legend: The median score for the sample was 2 (below expectations)										

Key observations with regards to biodiversity in supplier requirements were:

- one company included a no-go criterion with regards to High Biodiversity Value (HBV) areas, indigenous forests and conversion of natural forests;
- one company required responsible wood certification requirements;
- one company confirmed being midst rolling out of the SusFarMS system to out growers;
- one company confirmed a requirement for suppliers to comply with a specific suppliers' and contractors' standard, as well as company sustainability policy;
- one company confirmed suppliers to comply with company policies, and
- two companies made use of an online procurement or supplier portal.

A good practice identified with one of the forestry companies was the no-go criterion. Their wood, pulp and material sourcing policies included the following statements:

- "*Do not destroy high conservation values in forestry operations*",
- "*is not sourced from any indigenous forest or woodland or any other area that has high conservation values which are threatened by forestry activities*", and
- "*does not come from plantations which have been converted from natural forests*".

Both the forestry companies recognised an important challenge in their supply chain management with regards to requiring small-scale growers to obtain FSC certification or equivalent. The FSC certification is too extensive for small growers and therefore requires the companies to work towards amending certification requirements whilst not compromising environmental performance in order to promote inclusive growth.

Biodiversity in Annual Reports

The study identified great variance in approach and emphasis on biodiversity reporting despite most of the companies confirming compliance with core reporting requirements of G4 GRI. Over half of

the studied companies scored “meeting expectations or above expectations with regards to biodiversity in annual reporting.

Biodiversity was included in the annual reports (2015 and 2014) by all of the studied companies whilst the emphasis on biodiversity varied greatly between the studied companies with one company mentioning the word biodiversity and ecosystem in total 86 times in their 2015 annual reporting exercise and another company mentioning the same words only twice. Table 4.8 below summarises key biodiversity-related words and the frequency of appearance within the 2015 sustainability reporting exercise with only a few companies placing a greater emphasis on biodiversity in their annual reporting as opposed to the other studied companies.

TABLE 4.8 BIODIVERSITY & ECOSYSTEM IN ANNUAL REPORTING

	Forestry Comp.1	Forestry Comp.2	Sugar Comp.1	Sugar Comp. 2	Mining Comp. 1	Mining Comp. 2	Mining Comp. 3	Mining Comp. 4	Mining Comp. 5
Biodiversity	4	16	3	2	5	2	20	5	13
Ecosystem	0	70	2	1	0	0	10	1	4
Wetland(s)	0	10	0	0	0	0	1	0	11
Grassland(s)	1	0	0	0	0	0	0	0	7
Alien Invasive	1	1	0	0	0	0	1	0	0

The companies were scored based on their compliance with the GRI G4 recommendations on biodiversity reporting. The final scores for the studied companies are summarised in Table 4.9 below.

TABLE 4.9 SCORING ASSESSMENT OF BIODIVERSITY IN SUSTAINABILITY REPORTING

Biodiversity in Sustainability Reporting 2015										
	Rating	**Forestry Comp. 1**	**Forestry Comp. 2**	**Sugar Comp. 1**	**Sugar Comp. 2**	**Mining Comp. 1**	**Mining Comp. 2**	**Mining Comp. 3**	**Mining Comp. 4**	**Mining Comp. 5**
1	Far below expectations				1		1			
2	Below expectations	2								
3	Meets expectations			3		3			3	
4	Exceeds expectations		4					4		4
5	Far exceeds expectations									
Note; The median score for the for the sample was 3 (Meets expectations)										

The study identified two good practices with regards to biodiversity reporting and addressing GRI G4 metrics (especially metric EN11 and EN14). The examples identified were:

- one company provided a detailed mapping of operations, land description, biodiversity value, proximity to high biodiversity value areas and conservation target for the area in percentage, and
- one company provided a detailed mapping of occurrence of IUCN Red Listed species, the South African Red Listed species and any other protected species of flora and fauna within their land areas,

However, the first company did not include a mapping of presence of IUCN classified red listed species as recommended by GRI (G4 EN14), and the second company did not include information as to how potential impacts on red listed species would be managed.

Biodiversity in Stakeholder Relations and Engagements

The emphasis on and detail about external collaborations and partnerships relevant to biodiversity management varied greatly between the companies. The study identified a few good practices in terms of external collaborations and their potential for influencing operational practices and impacts. Several of the studied companies made reference to engagements with both academic institutions and NGOs relevant to biodiversity management. Key observations on integrating biodiversity in stakeholder engagements included:

- three mining companies confirmed the use of stakeholders to inform and/or manage biodiversity impacts;
- one of the forestry companies confirmed the use of stakeholders in the following manner:
    - engagements with academic institutions to improve and/or reduce impacts to biodiversity,
    - engagements with NGOs on biodiversity, ecosystems and HCVs related matter, and
    - engagements with communities on impacts and rehabilitation.
- one of the forestry companies confirmed the use of environmental liaison committee at their operations.

The interview with the mining company confirmed incorporation of biodiversity in stakeholder engagements, which is required by the Mining and Biodiversity Guidelines. Both the interviewed companies confirmed the bulk of engagements would be through the impact assessment process.

Two of the companies (one forestry and one mining company) demonstrated a stronger focus on collaborations and partnerships. The forestry company confirmed their membership and/or association with six different organisations, and partnership with two additional organisations on

biodiversity aspects alone. This demonstrated a stronger emphasis on stakeholders and biodiversity than the other studied companies. The company demonstrated best practice in terms of stakeholder collaborations as the collaborations were in addition intended to inform and improve on corporate biodiversity management practices with a focus on wetlands management and ecological network. The studied companies mentioned collaborations with the following NGO's:

- the Wildlife and Environment Society of South Africa (WESSA),
- BirdLife SA,
- WWF,
- Endangered Wildlife Trust (EWT),
- Federation for a Sustainable Environment,
- Ezemvelo KwaZulu-Natal (KZN) Wildlife,
- High Conservation Value (HCV) Resource Network,
- WBCSD Ecosystem Focus Area Action Team, and
- Escarpment Environmental Protection Group.

Table 4.10 provides an overview of the studied companies' academic collaborations and research funding mentioned in their 2015 annual reporting.

TABLE 4.10 BIODIVERSITY RELATED COLLABORATIONS WITH ACADEMIC INSTITUTIONS

	Academic Institution	Collaborative research / programme
Forestry Comp.	University of Pretoria	- Tree Pathology Co-operative programme - Eucalyptus Genome Network (EUCAGEN)
	University of Cape Town	- Animal Demography Unit (ADU) tree project
Forestry Comp.	University of Pretoria	- Partnership with Forestry and Agricultural Biotechnology Institute
	University of Stellenbosch	- "COMPANY" Ecological Networks Programme (Department of Conservation Ecology and Entomology)
	Cambridge Institute for Sustainability Leadership (CISL)	- Pilot tester for the Cambridge-IUCN consortium for the Natural Capital Protocol
	University of KwaZulu-Natal (UKZN)	- Patron of the Institute of Commercial Forestry Research (ICFR) - Soil and water research - Two streams catchment research
Mining Comp.	University of Stellenbosch	- Sustainable Infrastructure Programme
Mining Comp.	Witwatersrand University	- Groundwater research funding
	North-West University	- Groundwater research funding
Mining Comp.	Witwatersrand University	- Chair in global change and sustainability research platform
	University of South Africa (UNISA)	- Chair in business and climate change

	Academic Institution	Collaborative research / programme
	University of Pretoria	- Business and biodiversity leadership

Biodiversity in Company Benchmarking Exercises

The study did not identify the use of dedicated biodiversity benchmarking exercises, and the inclusion of biodiversity in benchmarking was pre-dominantly indirect.

One of the studied mining companies and one of the forestry companies, confirmed participation in two voluntary environmental benchmark exercises: the Global Carbon Project and the Water Disclosure Project. A third company (mining) also confirmed the participation in the Carbon Disclosure Project. The interviewed mining company confirmed a benchmarking exercise through Dow Jones Sustainability Index, whilst the interviewed sugar company confirmed that there was currently no benchmarking exercise with relevance to biodiversity performance.

Biodiversity Management and Business Decisions

There was little information through secondary data informing how biodiversity may explicitly have influenced decision-making in the studied sectors. However, there were various practical examples mentioned that can be interpreted as biodiversity having a certain influence on business operations, and therefore decisions:

- Establishment, support and/or management of conservation areas or species conservation programmes,
    - Manketti game reserve
    - African grass-owl conservation project
    - Flamingo conservation project
    - Sungazer lizard conservation project
    - Save the Midmar Dam project, a wetlands restoration programme
- About 25-30% of the land managed by the two forestry companies are set aside for conservation,
- One of the forestry companies confirmed partnerships resulting in improved operational practices around wetlands and on the management of ecological networks
- No-go criteria for suppliers (see 4.3.7) on HCV areas and indigenous forests,
- Sustainability certification programmes such as FSC and SusFarMS,
- Identification of endangered fynbos biome on mined land resulted in establishing this area as an exclusion zone with a retention wall (several hundred meters long and 12 meters high) ensuring no encroachment from the mining dumps,

- Relocation strategies in place for flora and fauna if encountered at operations,
- Operations requiring re-design to avoid affecting various wetlands areas,
- Species relocation programmes such as for baboon spiders and frithia
- Investments into water treatment plants in order to advance zero-discharge principle, and
- An indigenous species nursery to re-populate remediated land.

The interviewed sugar company confirmed two key changes to their farming practices with beneficial impacts to biodiversity. One approach was to move from harvesting techniques involving burning the field to green harvesting techniques. Green harvesting means leaving the cane stems in order to retain soil and reduce erosion, and also to reduce risk of fire spreading to nearby natural areas. They have also identified a new approach to growing grass in order to retain soil, reduce erosion, support local fauna and function, and increase communal grazing land. The interviewed mining company confirmed the potential influence biodiversity might have in business planning. They provided an example of a project in planning stages where the presence of a red-listed mammal specie has been identified. The company is currently studying how they can best manage this impact (avoid habitat versus relocate). This will be further assessed as part of the impact assessment exercise.

5. Discussion

5.1 Biodiversity Guidelines and Best Practice

The studied companies confirmed being guided by sustainability principles and guidelines such as the UN Global Compact Principles, and to some extent the UN Sustainability Goals. There were less dedicated international biodiversity best practice guidelines confirmed by the studied companies. The exceptions were references to the IUCN Red List, the Integrated Biodiversity Assessment Tool (IBAT) tool, GIS systems and international certification programmes. The mining sector seemed to have a stronger support through guidelines developed by the ICMM (Good Practice Guidelines) and the South African Mining and Biodiversity Guidelines. Among the studied companies these guidelines seemed to be accepted practice. There were also several references to guidelines by the South African WRC such as the Wet-Health and Wet-EcoServices. These guidelines were referenced by both mining and forestry companies as evidence of use and applicability across sectors. For the sugar and forestry sectors sectorial biodiversity management guidelines were not identified, and the sectors seemed to have a stronger reliance on certification programmes such as FSC and SusFarMS certification programmes. Both of the sectors were having difficulty requiring smaller suppliers to comply with these programmes as too extensive and cost-intensive for small growers.

This study identified few cross-sector guidelines and recommendations on biodiversity management with exception of specialised tools such as the IUCN Red List, GIS systems and Wet-Health. Furthermore, there were few references made with regards to inter-sector engagements. There may be room for more overarching recommendations in South Africa on biodiversity management in order to achieve consistency in approach and performance between the sectors. Therefor a cross-sectorial biodiversity guideline outlining key principles and minimum considerations may be of benefit to South African companies. This recommendation is supported by NBBN directly and through a survey by NBBN (2015) of 33 South African companies, which found that less than 40% of the surveyed companies demonstrated a good understanding of biodiversity. The survey recommended increased information sharing to improve companies' understanding and use of biodiversity management tools.

The study of the nine South African companies did not reveal a general uptake of the No Net Loss concept. The interview with one of the mining companies confirmed the difficulties with measuring and hence applying the No Net Loss concept in practical terms. The company confirmed an interest in detailed guidelines on practical implementation practices on the ground. An example of an attempted No Net Loss strategy via the use of biodiversity offset in the mining sector is the impact mitigation collaboration by Rio Tinto in Madagascar. A study by Virah-Sawmy *et al*. (2014) proposed a formula for practically measuring No Net Loss based on the Rio Tinto example, and concluded that whether or not No Net Loss can be achieved depends on the selection of the

deforestation rate used for the assessment. The study continued to recommend a more science–based transparent approach to measuring No Net Loss. In South Africa, there is a more recent case of the Gamsberg zinc mine in succulent Karoo. The mine development has in collaboration with IUCN and other stakeholders developed a biodiversity management system, which includes an offsetting scheme based on the No Net Loss concept (IUCN, 2014; ERM, 2013). These can be useful examples of applying the No Net Loss concept in an African and South African context, as well as interesting for further case study research on No Net Loss in practice.

A key component (as a last resort of impact mitigation) to achieving No Net Loss is biodiversity offsetting (Virah-Sawmy *et al.,* 2014). One of the studied mining companies confirmed working on a biodiversity-offset policy. There were no other companies confirming the application of biodiversity offsetting. Having said that, several of the companies were, or had been, involved in developing and/or supporting nature reserves and other conservation activities. This could be interpreted as a form of informal biodiversity offsetting. Approaches to biodiversity offsetting found in France, Brazil and South Africa are based on offset ratios meaning that, when purchasing certain areas for biodiversity offsetting, the ratio of land disturbed to land protected elsewhere is the offset ratio (Quetier & Lavorel, 2011). It is worth noting that in the case of the Western Cape's approach to biodiversity offsetting for example, these ratios are not 1:1 and do not therefore achieve a No Net Loss (Quetier & Lavorel, 2011). The Gamsberg mine has designed a biodiversity-offsetting programme over and above legislated requirements. The scheme uses a combination of like-for-like or like-for-better approach (i.e. No Net Loss or Net Positive Impact) (ERM, 2013). The study by Virah-Sawmy *et al.* (2014) confirmed a general acceptance of key principles behind BBOP methods and recommendations, such as equity, vulnerability, long-term conservation perspective, transparency, and good science. The study furthermore highlighted similar challenges and issues in developing forest carbon credit systems which can therefore be a source of learning for developing biodiversity offset strategies and recommendations. A study by Mann (2015) found that issues of biodiversity offset programmes often stem from both political and value driven stand-points, and recommended that any biodiversity offsetting policy or programme should be developed through obtaining a wide consensus on proposed methodology prior to implementation. Another study (Quetier & Lavorel, 2011) highlighted the benefits of biodiversity offset programmes from assessment methods that address the time delays between impact occurred versus offset benefit achieved, and duration of company liability for offset outcome to be realised. An in-depth case study of the Gamsberg mine may address some of the recommended research developments.

The ecosystem services and payments for ecosystem services (PES) methodologies were also not identified through the review of the studied companies. Biodiversity offsetting is an approach promoted as a market based instrument for conservation, whilst a study by Lapeyre *et al.* (2015) found that, when reviewing various implementation schemes of biodiversity offsetting programmes, in practice these were generally more of a partnership or collaboration between a company (responsible for the impact) and an NGO (responsible for implementing conservation strategies).

The sugar and forestry companies made no reference to agroforestry or other specific biodiversity promoting farming concepts. In Brazil there have been positive studies on the benefits of agroforestry and sugarcane production highlighting the benefits of hedgerow systems to reduce soil erosion slopes, as well indicating a better suitability for non-mechanised farming practices (Pinto *et al.*, 2001; Pinto *et al.*, 2003; Rodrigues-Gonzales & Vivan, 2012). However, the potential positive and/or negative effects on sugarcane production yield depend on the specie used for alley-cropping (Singh, 2016). The study did not find South African studies on tree or shrub species that may have a beneficial influence on sugarcane production, whilst having a beneficial impact on the environment. Further studies in the field of sugarcane production and agroforestry opportunities in South Africa might be needed in order to support uptake of this practice in the South African sugar industry. Furthermore, a lot of the research identified on agroforestry refers to smallholder farming practices and livelihood strategies (Pinto *et al.*, 2001; Pinto *et al.*, 2003; Rodrigues-Gonzales & Vivan, 2012; Singh, 2016). This might therefore result in a reduced uptake of the practices for industrial plantations and/or farms. According to a study by Meijer *et al.* (2014) the adoption rates of agroforestry practices in the sub-Saharan region are relatively low, whilst there are no clear insights to the reasons for this phenomenon.

5.2 Corporate Biodiversity Management Practices

Biodiversity in Principles and Values

A company's documentation of core values and principles is driven by two factors: to incite employee behaviour and to provide public assurance. A study by Levis (2006) confirmed the effectiveness of such management tools in order to minimise undesirable behaviour by company managers and employees. This is especially the case for multinational companies where there is an extensive mix of worldviews and backgrounds among the employees. However, the study also highlighted the self-regulating weakness of these management tools. The nine South African companies generally made use of a code of ethics or code of conduct where a high level statement on sustainability and/or environment was included. Gilley *et al.* (2010) confirms the importance of leadership commitment to the code of conduct or ethics for effectiveness and implementation. In their study of the Korean service industry it was found that there was a positive correlation between having a code of ethics and corporate philanthropy. The study confirmed mixed results on the effectiveness of a code of ethics whilst it was found to have a potential to impact behaviour of its employees positively (Lee *et al.,* 2014). The study did not identify research with regards to the importance of the code of ethics and/or code of conduct related to a company's biodiversity performance, but revealed that some of the companies demonstrated a stronger integration of sustainability and/or biodiversity in their values

and principles through a commitment of zero harm to the environment, dedicated sustainability and environmental statements, as well as through a sustainability charter. Yosgata *et al*. (2011) studied a sample of Turkish companies and found that there is an increase of environmental and social integration in company values. The study also found that corporate values can be a very effective tool on behaviour, and therefore has an opportunity to positively influence environmental performance of a company. For this study the companies reviewed included sustainability considerations in their codes of ethics/conduct (where these documents could be confirmed), whilst there were considerable differences between the companies in their biodiversity management approach and emphasis in annual reporting. Therefore similar trends cannot be identified for this study. This could in part be due to looking at a smaller subset of sustainability (i.e. biodiversity) as opposed to sustainability in general, whilst further research is required to draw firm conclusions.

Biodiversity in Sustainability Governance Structure

Making use of a Biodiversity Management System supported by dedicated biodiversity policies and standards may support South African companies in having a more structured approach to addressing biodiversity impacts of their activities (Imboden *et al.*, 2010). The study of the nine companies revealed a mixed consistency and level of development of dedicated biodiversity management documentation. There was only one of the studied companies that publicly reported on 5-yearly commitments and targets, and where this included a dedicated commitment with regards to biodiversity. Furthermore, one of the other companies confirmed having a biodiversity strategy in place. The lack of consistently having a vision with regards to biodiversity management seen in this study was corroborated through the survey by NBBN (2015) of 33 South African companies across various sectors. The study found that, as many as 60% of the companies lacked a focused approach to biodiversity management, i.e. did not have a strategy or objectives on biodiversity management.

There were a few of the studied companies that demonstrated a dedicated structured approach to biodiversity management through a dedicated biodiversity policy or standard. However neither of these documents were shared publicly. One of the companies had integrated biodiversity requirements into their standard for sustainable forestry. The survey by NBBN (2015) found that only 10% of the surveyed companies had incorporated biodiversity at a strategic, management and operational level of the organisation. The survey by ICMM of its member organisations found that about 55% of the members had a biodiversity strategy, commitments, policy or internal guidance in place in 2013, and just over 20% had a commitment to No Net Loss.

This confirms that there might be room for improvement with regards to having a structured biodiversity management structure in place. Furthermore, it provides some insight to research question two of this study whether the companies demonstrate a structured approach to managing biodiversity aspects of their business. The study found a few examples of biodiversity strategies and

policies publicly available from for example CEMEX S.A.B. de C.V. (building materials company), LaFarge Ltd. (cement and concrete) and RioTinto Ltd. (mining) (LaFarge, 2014; CEMEX, 2016; RioTinto, 2016). These may be useful examples for companies wanting to develop a biodiversity strategy or policy in addition to the IFC performance standard on biodiversity and the recommendations outlined in the Business and Biodiversity Handbook (Schaltegger & Bestandig, 2012).

Lender Requirements on Biodiversity Management

The South African finance sector has a responsibility to manage its indirect biodiversity impacts, and is in a strong position to influence companies towards adopting best practices (Neu *et al.*, 2006; OECD, 2016). An example where the finance sector has been a force for improved management relates to SOCO International Plc. (SOCO) exploration activities in a national park with United Nations Educational, Scientific and Cultural Organisation (UNESCO) world heritage status in the Democratic Republic of Congo (DRC). Through institutional pressure, SOCO finally agreed to await further exploration till UNESCO and DRC had come to an agreement on activities in the area (OECD, 2016). The study by Neu *et al.* (2006) found that institutions such as World Bank could even have an indirect positive influence on companies' sustainability practices through government funding. Government funding would include specifications for government bidding and procurement approaches, as well as reporting. These requirements would have a trickle-down effect on company performance.

This study found evidence of three South African banks adopting international best practices for responsible investment, and that they have an opportunity for pushing biodiversity best practice. In the example found in this study this was not realised to its full as the bank merely requested a self-assessment check as opposed to conducting detailed and/or on-site assessments. The nine studied companies generally made little reference to lender requirements, especially with regards to potential environment or biodiversity management requirements.

This study found that one of the banks applying IFC standards made use of a financial criterion to trigger the application of the standards in accordance with the equator principles. The financial size of the funding may be an indicator of the project complexity and scale, as well as the financial risk associated with a project. However it is to a large degree decoupled from the environmental risks and impacts that a project may pose. The bank may find that it would have a more consistent approach to managing its indirect impacts through applying environmental and social risk or impact-based criteria to trigger the application of the IFC performance standards. The IFC performance standard on Procedure for Environmental and Social Review of Projects refers to this approach categorising the project in three categories; Category A (significant risks and impacts), Category B (medium risks and impacts) and Category C (minimal, site based or no adverse

environmental impacts) (IFC, 1998). ABN Amro (ABN Amro Bank N.V.) is an example of a Dutch bank that is applying the IFC risk categorisation in their investment evaluations (COWI A/S, 2010).

The IFC performance standards did not see the wide adoption as seen with for example the UN Global Compact Principles through voluntary commitment statements. Furthermore, the application of a project budget application criterion may indicate that the standards do not have strong influence on sustainability and biodiversity management practices. This may be an indicator that the banks of South Africa could increase their pressure on South African companies towards more sustainable practices. The study results give an impression that there is untapped potential in the finance sector to further drive the biodiversity management agenda in South Africa. Further studies on the potential role that the financial sector can play in the drive towards achieving the sustainable development goals could be of great benefit to the biodiversity conservation agenda.

Biodiversity in Risk and Impact Assessments

One of the opportunities companies have to early recognise its external risks and impacts is through its risk assessment procedures. Enterprise Risk Management is recognised as a good corporate governance tool whilst its implementation can be more difficult for companies in practice (Fraser & Simkins, 2016).

Three of the companies had defined biodiversity-related concerns as a material issue for the company. However, for several of the studied companies sustainability and/or biodiversity did not feature in the company's reporting of material risks and issues. According to the survey by NBBN (2015), more than 50% of the respondents to the survey considered that South African companies generally did not have a sufficiently good understanding of their biodiversity risks and opportunities supporting the results of this study. This finding provides some insights to research question two whether the companies demonstrate a structured process to identify and manage biodiversity aspects.

A dedicated biodiversity risk matrix could be one tool to better understand the company biodiversity risks. However, the study did not identify examples of this in practice, as an approach to ensuring adequate assessment of biodiversity risks. The companies interviewed were not aware of the risk matrix specifically developed by IUCN and Holcim. The study did not identify existing research on the effectiveness or level of implementation of a dedicated biodiversity risk matrix. Other tools that could be of interest to increase companies' understanding of biodiversity risks are biodiversity risk and opportunity assessments. The NBBN survey (2015) found that about 50% of the respondents would favour a more focused risks and opportunities assessment for biodiversity. The NBBN (2015) survey also found that just over 20% of the companies surveyed made use of biodiversity risk and opportunity assessments indicating that companies lack a structured approach to identify and manage biodiversity aspects. This study found that only one company mentioned the

use of an IBAT. This study would recommend further research on the use and application of various biodiversity risk and dependencies assessments for companies in order to support companies in better understanding their risks and dependencies on biodiversity (Dempsey, 2012; D'Amato *et al.*, 2016).

Biodiversity in Management Tools

The key environmental tool with indirect implications for biodiversity that was used across sectors by all of the studied companies was ISO14001. The sugar and forestry industries also made use of sectorial sustainability certification programmes such as SusFarMS and FSC, which can be observed for several sectors in South Africa (e.g. Sustainable Wine South Africa (SWSA), Rooibos Sustainability Standards) (Pretorius *et al.*, 2011; SWSA, 2016). This suggests that certification programmes can have, and potentially already have, a key role in addressing corporate biodiversity impacts. A review by UNEP World Conservation Monitoring Centre (WCMC) (2011) of 36 different environmental standards and certification schemes revealed a general incorporation of habitat protection and restoration related requirements, whilst few of them were referring to a biodiversity mitigation hierarchy and the concepts of No Net Loss and/or Net Positive Impact. The review also found a lack of standardized terminology used across the standards. This indicates that companies cannot solely rely on certification schemes to manage their biodiversity impacts. The results of this study corroborate the findings of UNEP and WCMC, as it did not identify a consistent application of biodiversity management framework elements (i.e. biodiversity policy or standard), albeit all of the companies being ISO14001 certified.

The study did not identify the existence, nor the use, of dedicated biodiversity certification programmes or South African developed cross-sector biodiversity certification programmes. The Wildlife Trust in the United Kingdom runs "*The Biodiversity Benchmark*" that is effectively a certification programme for British businesses across sectors (Wildlife Trust, 2016). The EU is similarly running the European Biodiversity Standard certifying corporate biodiversity management systems. These programmes are generally intended as supporting management system programmes to the more general environmental management systems of a company (The European Biodiversity Standard, 2016). Further research into the value and possibility for a similar certification programme in South Africa could be of interest in order to support the mainstreaming of biodiversity into South African companies.

The study found that other biodiversity tools most frequently mentioned by the companies were BAPs (especially in the mining sector) and GIS. However, several of the companies confirming the use of BAPs would integrate these in their environmental management plan (EMP). It is worth noting that the IFC Performance Standard 6 expresses a preference for biodiversity action plans to remain separate to the EMPs as the biodiversity commitments risk getting buried in the numerous

activities and receive less focused attention if integrated in the EMP (IFC, 2012). The survey by NBBN (2015) found that over 20% of the surveyed companies made use of biodiversity actions plans whilst the most important tool mentioned by the companies was impact assessment.

Biodiversity in Supplier Requirements

A company's sustainability performance is linked to the performance of its suppliers. There is a global trend towards developing sustainability assessments of the supply chain. Fritz *et al.* (2015) developed a set of sustainability assessment criteria that would include biodiversity indirectly through assessing external impacts of the supplier. A study by Whatling *et al*. (2010) found that for the companies and sectors studied biodiversity was generally poorly included in the supply chain management, and that the companies could benefit from using a biodiversity tool such as Toolkit for Assessing Biodiversity in the Supply Chain (TABS). A study by Quarshie *et al*. (2015) concluded that the biodiversity and deforestation topic as part of supply chain management research and discussions did not receive significant attention, and the study proposed further research in this field.

This study found that the forestry companies seemed to have a stronger focus on environmental sustainability (and therefore biodiversity) in their supply chain management. Lahtinen *et al*. (2016) confirmed that forestry companies with large and fast growing plantations tended to have a stronger focus on biodiversity and ecosystem services than other forestry companies. However, their study was not comparing management practices across sectors. This study revealed that the forestry companies had for examples no-go criteria with regards to supply from HBV areas and indigenous forests, as well as plantations that had converted natural forests. This no-go criterion was not identified with the studied sugar companies, and there may be a potential best practice that can be taken up across sectors. This finding provides some insight to research question three whether there are differences in awareness and approaches to biodiversity management between the sectors. However further studies with larger study samples would be required to develop generalised findings on sectorial differences.

Biodiversity in Annual Reporting

The emphasis on biodiversity as an issue in the annual reporting varied greatly between the studied companies, as well as the interpretation and details provided for the biodiversity metrics of GRI G4. Similar results were found in a study by Potdar *et al.* (2016) where they assessed 101 companies on their biodiversity reporting. The study scored the company reporting efforts from 1 to 5, and found that only 13% of the companies achieved top score. The CBD and UNEP (2016) found similar inconsistencies in businesses' approach to biodiversity reporting, and highlighted that strong external focus on other environmental concerns such as climate change and water may deflect

company attention from biodiversity, as well as finding the topic slightly more complex and difficult to report on. It may also link back to the emphasis of the GRI guidelines. A company is required to report on topics identified as material issues or risks to the company, whilst can chose to not report on every sustainability aspect (GRI, 2013). In this study only three of the nine studied companies identified a biodiversity-related issue as a material risk or issue, and this would explain the difference between reporting on biodiversity between the companies. In addition, GRI focuses on significant and direct impacts on HBVs, protected areas and red-listed species, in addition to considerations for operational footprint. The metrics do not include other aspects such as opportunities to enhance biodiversity conditions (GRI, 2013). The French government has adopted a slightly different approach to GRI where larger companies (>500 employees) have to report on measures taken to protect or enhance biodiversity (among other sustainability metrics) (Kaya, 2016). This could encourage companies to consider and include biodiversity enhancement measures irrespective of trigger criteria such as proximity to high biodiversity value areas or Red-Listed species. However, the French reporting requirements do not provide special consideration for significant biodiversity impacts, and a company could report on excellent conservation initiatives whilst omitting information on significant impacts on key biodiversity resources.

A study of 24 companies in Denmark from 2013 (Liemp & Busch, 2013) found that the Danish generally reported poorly on biodiversity-related matters, and a study by Fonseca *et al.* (2012) on reporting in the mining sector found that the reporting on the biodiversity related metrics could become too generic and non-contextual. This was also seen with some of the companies for this research with statements such as “do not operate in or nearby a protected area” as the main biodiversity related reporting information. Furthermore, high-level statements on the extent of disturbed land versus extent of land rehabilitated do not provide information on actual biodiversity outcomes and mitigation results (Fonseca *et al.*, 2012). Similar to the study of Fonseca *et al.* (2012), this study found that this was particularly the case for companies with a global presence reporting on global company performance. This study identified three South African companies from mining and forestry sector with better details and accuracy in their biodiversity reporting than the other companies. Two of the companies demonstrated good practice in terms of the efforts to transparently map the locations of operations with biodiversity habitat and species of concern (i.e. metric EN11 and EN14). This indicates a possibility for a more standardised approach to reporting cross sectors, and in key sectors affecting biodiversity. It is worth noting that these maps could be further improved with inclusion of specific measures taken to mitigate impacts.

Another challenge to the development and use of biodiversity reporting metrics relates to the measurability of biodiversity outcome and results. It may not always be possible to capture the results of a single company’s efforts to conserve biodiversity. Therefore, in many cases biodiversity reporting may be more valuable to report on at a cumulative level looking at a specific catchment or ecological network area (Antolín-Lopez *et al.*, 2016). The report by the CBD and UNEP (2016) recommends development of biodiversity indicators for business relevant to measure a country’s

progress against the Aichi Biodiversity Targets in order to better understand progress towards global biodiversity priorities. A study by Brummitt *et al.* (2016) proposes to make use of a Living Planet Index measuring the fluxes of animal species abundance, as one would do for a stock market in order to develop KPIs for measuring progress against one of the Aichi targets. This could have a potential for becoming a corporate KPI measuring cumulative results of biodiversity management efforts. The challenge would of course be that for larger faunal species the KPI results could not easily account for external factors.

These findings provide some insights to research question one as to the level of biodiversity consideration in corporate external communication. There are differences as to the inclusion and approach to communicating on biodiversity among the companies, and it may in part be explained by the complexity and corporate understanding of the topic.

Biodiversity in Stakeholder Relations and Engagements

The corporate world is seeing an increasing interest in collaborating with external stakeholders, generally with academic institutions and/or NGO's (COWI, 2010; Bitzer & Glasbergen, 2015). The benefits with these collaborations are linked to sharing of learning and expertise (Bitzer & Glasbergen, 2015). Furthermore, the company may gain credibility while their collaborative partner may gain stronger ability to influence course of action (COWI, 2010). In some cases dedicated platforms for collaborations support the integration of sustainability (and biodiversity) in the industry with examples such as Roundtable on Sustainable Palm Oil (COWI, 2010). In the case of South Africa there is the NBBN network (EWT, 2016). One of the studied companies was identified as a supporting partner of the NBBN network (EWT, 2016), whilst companies may partake in various organised events without being a dedicated partner. However, this network was not mentioned in the annual reporting by the studied companies. Similar to the general reporting on biodiversity the emphasis and detail provided on stakeholder engagement and biodiversity varied between the companies with some companies listing several collaborations relevant to biodiversity whilst other companies did not mentioning this aspect. One of the studied companies demonstrated better practice than the remaining companies. In addition to several different collaborations with both NGO's and academic institutions, the company has had a partnership with an NGO's since the 1990's, aiming to improve operational knowledge and practices in wetlands areas, i.e. developing buffer zones and restoring wetlands. The NBBN survey (2015) confirms the relative importance of partnerships as a biodiversity management where 40% of the companies confirmed the use of partnerships.

Biodiversity in Company Benchmarking Exercises

There was little emphasis on sustainability benchmarking in the company annual reporting, and the study only identified the use of two different benchmarking activities; the Carbon Disclosure Project and the Dow Jones Sustainability Index (DJSI). The questionnaire used for the assessment contains direct questions relevant to biodiversity, as well as questions on supply chain management with potential indirect links to biodiversity (CBD & UNEP, 2016). The Carbon Disclosure project has some indirect relevance to biodiversity due to including themes such as deforestation and water scarcity (CBD & UNEP, 2016). This study did not identify dedicated biodiversity benchmarking programmes. This may be due to difficulties setting it up and ensuring like-for-like comparisons of KPI's within biodiversity, referring back to the same issues as encountered for biodiversity reporting.

Biodiversity and Business Decisions

There is evidence that biodiversity considerations have had an effect on operational practices and/or business decisions of the studied companies to some extent answering research question four. This is demonstrated through incorporation of new and/or improved management policies and standards, or through identification of protected species and HBV areas for conservation. Good practice examples of this impact are for example:

1. Long-term partnerships with academic and NGO institutions aimed at influencing operational practices,
2. Inclusion of biodiversity metrics in GIS data systems for early identification of biodiversity risks in project developments,
3. About a 30% of managed forestry land set aside for conservation, and
4. Species relocation programmes followed up with monitoring to ensure a successful translocation.

The wetlands restoration collaboration with one of the studied forestry companies is also included in CBD's database of best practice case studies (CBD, 2010).

Having said that it was also noted that there was little change in information provided in the annual reports from 2014 to 2015. The level of detail and number of examples provided on biodiversity in practice varied greatly between the companies. As mentioned there were several biodiversity-in-practice examples provided whilst there were few more recent examples (i.e. specific initiatives in 2014 and 2015) with the exception of partnership collaborations initiated and research delivery.

5.3 Conclusions

The world is facing increasing pressure on biodiversity, and continuing negative trends of biodiversity loss and deforestation. South Africa is among the most biodiverse countries in the world with similar negative trends and losses. Both globally and nationally there is recognition that key biodiversity goals cannot be achieved without the active support and partaking of the private sector. Mainstreaming biodiversity into business is a relatively young topic with best practice recommendations emerging over the last 15-year period with emerging concepts gaining ground such as No Net Loss, biodiversity offsetting and payment for ecosystem services. The study aimed to research corporate uptake of biodiversity management concepts and best practice recommendations among a selection of companies in sectors recognised for considerable biodiversity impacts. There are few studies within this domain in South Africa, and the existing body of knowledge recommended further studies to increase the understanding of how South African corporate biodiversity management could be better addressed.

The study found a wide acceptance of the UN Global Compact Principles, the GRI reporting guidelines and the King Code of good governance principles. There were some evidence of influence by the IFC performance standards, whilst no confirmation of the applicability of the IFC standard on biodiversity specifically. The study did not reveal a particular uptake of emerging biodiversity concepts such as No Net Loss or payment for ecosystem services. There was also no evidence of agroforestry practices identified among the forestry and sugar companies studied. Several of the studied companies demonstrated presence of elements of a biodiversity management framework, whilst there was room for improvement with regards to achieving a more documented and formalised framework to biodiversity management. Having said that, one of the mining companies demonstrated good practice through the on-going development of a biodiversity policy and standard, as well as an offsetting policy in addition to the company's wetland policy and standard.

The study identified differences in management approaches among the companies, whilst few sector specific differences were observed. However, the forestry sector demonstrated good practice with its emphasis on biodiversity in its supply chain management. A strong element of the supply chain management was the FSC certification scheme. The ISO14001 standard was not confirmed to have the same influence on specific biodiversity management due to mixed consistency in the demonstrated elements of a biodiversity management framework.

The findings on biodiversity in annual reporting were aligned with international studies facing challenges related to consistency and emphasis. However, it is worth noting that there were two examples of good practice identified (compared to the other studied companies) with regards to reporting according to the GRI reporting metrics EN11 and EN14 on high biodiversity value areas and red-listed species.

The study recommends further research on use and application of: various biodiversity risk and opportunity assessments, biodiversity certification schemes, as well as biodiversity considerations in supply chain management with possibilities for uptake of no-go criteria as developed by forestry companies in other sectors. The study also recommends further research into

the potential role of the financial sector in mainstreaming biodiversity into company practices. Furthermore, the study recommends further research in the merits of a cross-sectorial biodiversity management guideline for smaller and larger companies supporting a structured approach to identifying, assessing and mitigating biodiversity risks and impacts in South Africa.

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Appendices

Appendix 1: Overview of Biodiversity Guidelines and Tools

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
Series of case studies on conservation agriculture in Africa	Sustainability case studies	FAO	2007	Agricultural Sector	Global	http://www.fao.org/ag/ca/8.html	30.03.2016
Farming for the future: farming sustainably with nature	Sustainability Best Practice Examples	ADU	2010	Agricultural Sector	South Africa	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjtqaKdqfXLAhVEchQKHeMsDMEQFggdMAA&url=http%3A%2F%2Fwww.adu.org.za%2Fdocs%2Ffarming_for_the_future_lr.pdf&usg=AFQjCNHD6gupDPOgTGKAIogn9JcciNB3Ag	04.04.2016
Guideline on Biodiversity Management in the Cement and Aggregates Sector: Integrated Biodiversity Management System (IBMS)	Integrated Biodiversity Management System	IUCN	2014	Cement & Aggregates Sector	Global	http://www.uepg.eu/uploads/Modules/MediaRoom/2014-008.pdf	27.06.2016
No Net Loss and Net Positive Impact Approaches for Biodiversity	NPI	IUCN	2015	Agriculture & Forestry	Global	https://portals.iucn.org/library/sites/library/files/documents/2015-003.pdf	30.03.2016
Managing biodiversity at Holcim	Biodiversity Management System	HOLCIM	2010	Cement & Aggregates Sector	Global	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&cad=rja&uact=8&ved=0ahUKEwiLvZvn65zLAhWDVhQKHcxZDdsQFgg7MAQ&url=http%3A%2F%2Fwww.holcim.com%2Ffileadmin%2Ftemplates%2FCORP%2Fdoc%2FSD12%2F49714_HolcimBiodiversity_PDF.PDF&usg=AFQjCNEQePluOkEZtJOOVZGp3OOyXd06Wg	29.03.2016
Biodiversity Management System	Biodiversity Management System	IUCN-HOLCIM	2010	Cement & Aggregates Sector	Global	http://cmsdata.iucn.org/downloads/biodiversity_management_system___final.pdf	29.03.2016
Biodiversity Management in the Cement and Aggregates Sector - Brochure Summary	Biodiversity Management System	IUCN-HOLCIM	2014	Cement & Aggregates Sector	Global	http://cmsdata.iucn.org/downloads/iucn_biodiversity_summary_brochure_web_final.pdf	29.03.2016

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
Biodiversity Indicator and Reporting System (BIRS)	Biodiversity Monitoring & Reporting	IUCN-HOLCIM	2014	Cement & Aggregates Sector	Global	http://www.holcim.com/fileadmin/templates/CORP/doc/SD/BIRS_recommendations.pdf	29.03.2016
Biodiversity for Business	Biodiversity Tools Overview	IUCN-WBCSD	2014	Cross Sector	Global	https://portals.iucn.org/library/sites/library/files/documents/2014-004.pdf	29.03.2016
Biodiversity Offset - Technical Study Paper	Biodiversity Offsetting	IUCN	2014	Cross Sector	Global	https://portals.iucn.org/library/sites/library/files/documents/2014-044.pdf	29.03.2016
Net Positive Impact on Biodiversity - the business case	NPI	IUCN	2015	Cross Sector	Global	https://portals.iucn.org/library/sites/library/files/documents/Rep-2015-008.pdf	29.03.2016
IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species	Alien Species	IUCN	2000	Cross Sector	Global		29.03.2016
Guide to Corporate Ecosystem Valuation	Ecosystem Valuation	WBCSD	2011	Cross Sector	Global	http://www.wbcsd.org/pages/adm/download.aspx?id=253&objecttypeid=7	30.03.2016
Selected Ecosystem Valuation Concepts and Issues	Ecosystem Valuation	WBCSD	2011	Cross Sector	Global	http://www.wbcsd.org/pages/adm/download.aspx?id=5923&objecttypeid=7	30.03.2016
Eco4Biz - Ecosystem services and biodiversity tools to support business decision-making	Biodiversity Tools Overview	WBCSD	2013	Cross Sector	Global	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwiGgfK9pPfLAhUGDg8KHVOGAu4QFggdMAA&url=http%3A%2F%2Fwww.wbcsd.org%2Feco4biz2013.aspx&usg=AFQjCNGBiZrrE-21iFQMbDg0Rhebv5tnpg	30.03.2016
Biodiversity in Impact Assessments	Biodiversity in Impact Assessment	IAIA	2005	Cross Sector	Global	http://www.iaia.org/uploads/pdf/SP3.pdf	30.03.2016
Guide to Corporate Sustainability	Sustainability Requirements	UN GLOBAL COMPACT	2015	Cross Sector	Global	https://www.unglobalcompact.org/library/1151	30.03.2016
A Framework for Corporate Action on Biodiversity and Ecosystem Services	Biodiversity Management Principles	UN GLOBAL COMPACT	2012	Cross Sector	Global	https://www.unglobalcompact.org/docs/issues_doc/Environment/BES_Framework.pdf https://www.unglobalcompact.org/library/139	30.03.2016
Are you a Green Leader? Business & Biodiversity	Biodiversity Principles	UN GLOBAL COMPACT	2010	Cross Sector	Global	https://www.unglobalcompact.org/library/147	30.03.2016

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
G4 Sustainability Reporting Guidelines	Sustainability Reporting	GRI	2013	Cross Sector	Global	https://www.globalreporting.org/standards/g4/Pages/default.aspx	04.05.2016
G4 Mining and Metals Sector Disclosures Supplement	Sustainability Reporting	GRI	2013	Mining Sector	Global	https://www.globalreporting.org/standards/sector-guidance/sectorguidanceG4/Pages/default.aspx	04.05.2016
BBOP Guidelines Material: Offset Design Handbook, Appendices, Offset Implementation Handbook, No Net Loss Calculations, Biodiversity Offsets and Impact Assessments, Case Studies etc.	Biodiversity Offsetting	BBOP	-	Cross Sector	Global	http://bbop.forest-trends.org/pages/guidelines	02.04.2016
Strengthening implementation of the mitigation hierarchy	Mitigation Hierarchy	A CAMBRIDGE CONSERVATION INITIATIVE – COLLABORATIVE FUND PROJECT REPORT	2015	Cross Sector	Global	http://bbop.forest-trends.org/documents/	09.05.2016
Biodiversity Offsets Technical Study Paper	Biodiversity Offsetting	IUCN	2014	Cross Sector	Global	http://bbop.forest-trends.org/documents/	09.05.2016
Working towards NNL of Biodiversity and Beyond Ambatovy, Madagascar - A case Study	Biodiversity Offsetting	FOREST TRENDS and AMBATOVY	2014	Mining Sector	Madagascar	http://bbop.forest-trends.org/documents/	09.05.2016
Working towards NNL of Biodiversity and Beyond - Strongman Mine Case Study	Biodiversity Offsetting	SOLID ENERGY NEW ZEALAND LIMITED and FOREST TRENDS	2014	Mining Sector	New Zealand	http://bbop.forest-trends.org/documents/	09.05.2016
SABONET Reports & Newsletters	Various	SABONET	-	Cross Sector	South Africa	http://www.sanbi.org/information/documents?page=10	03.04.2016
SANBI Biodiversity Series	Biodiversity Conservation	SANBI	-	Cross Sector	South Africa	SANBI - information resources	03.04.2016
Building Strong Ecosystems for Adapting to Climate Change	Biodiversity Conservation	SANBI	2014	Cross Sector	South Africa	http://www.sanbi.org/node/10057/reference	03.04.2016

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
Guidance Document on Biodiversity, Impact Assessment and Decision Making in Southern Africa	Biodiversity in Impact Assessment	CBBIA - IAIA	2006	Cross Sector	Southern Africa	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjPo4WpjfXLAhUBsBQKHUrJAzgQFggiMAA&url=https%3A%2F%2Fwww.environment.gov.za%2Fsites%2Fdefault%2Ffiles%2Fdocs%2Fguidancedoconbiodiversity.pdf&usg=AFQjCNElVGxjWhOsMoUQVTrWvUPgWG0w6w	03.04.2016
Creating patches of native flowers facilitates crop pollination in large agricultural fields – mango as a test case.	Biodiversity and Productivity	British Ecological Society	2012	Cross Sector	South Africa	contact details to obtain: C.Seymour@sanbi.org.za	03.04.2016
Wetland Offsets: A Best Practical Guideline for South Africa - The Wetland Offsets Guideline Collaboration	Biodiversity Offsetting	SANBI	2015	Cross Sector	South Africa		03.04.2016
Grassland Ecosystem Guidelines - Landscape interpretation for planners and managers	Biodiversity Best Practice Principles	SANBI	2013	Cross Sector	South Africa	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjor6HthffLAhVJfxoKHRq1AvoQFggdMAA&url=http%3A%2F%2Fbiodiversityadvisor.sanbi.org%2Fwp-content%2Fuploads%2F2015%2F06%2F2013_Grassland-Ecosystem-Guidelines.pdf&usg=AFQjCNF3gFm1BzDqU0jQBnFZXtKUPX10Kw	03.04.2016
Classification System for Wetlands and other Aquatic Ecosystems in South Africa	Wetlands Classification	SANBI	2013	Cross Sector	South Africa	http://www.sanbi.org/sites/default/files/documents/documents/sanbi-biodiversity-series-wetlands-classification-no-22.pdf	09.05.2016
IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Biodiversity Performance Standards	IFC	2012	Cross Sector	Global	http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/learning+and+adapting/knowledge+products/publications/biodiversityguide	02.04.2016

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
A Guide to Biodiversity for the Private Sector	Biodiversity Management	IFC	2016	Cross Sector	Global	http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/learning+and+adapting/knowledge+products/publications/biodiversityguide	02.04.2016
Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Biodiversity Management	IFC	2012	Cross Sector	Global	http://www.ifc.org/wps/wcm/connect/a359a380498007e9a1b7f3336b93d75f/Updated_GN6-2012.pdf?MOD=AJPERES	02.04.2016
Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment	Biodiversity in Impact Assessment	CBD	2006	Cross Sector	Global	https://www.cbd.int/doc/publications/cbd-ts-26-en.pdf	01.04.2016
A cross-sector guide for implementing the Mitigation Hierarchy	Mitigation Hierarchy	CSBI	2015	Extractives Sector	Global	http://www.csbi.org.uk/wp-content/uploads/2015/09/CSBI-Mitigation-Hierarchy-Guide-Sept-2015-1.pdf	01.04.2016
Good Practices for the Collection of Biodiversity Baseline Data	Biodiversity Baseline Data	CSBI	2015	Extractives Sector	Global	http://www.icmm.com/document/9454	01.04.2016
Managing the BES issues along the asset life cycle - top 10 tips	Biodiversity Management Principles	IPIECA	2014	Extractives Sector	Global	http://www.ipieca.org/system/files/publications/Managing_BES_Top_10_tips_in_OG_industry_2014_0.pdf	30.03.2016
Making the connection: Oil and gas management of natural resources	Sustainability Management System	IPIECA	2013	Extractives Sector	Global	http://www.ipieca.org/system/files/publications/Making_the_connection_OG_management_of_natural_resources_0.pdf	30.03.2016
Alien invasive species and the oil and gas industry	Alien Species	IPIECA	2010	Extractives Sector	Global	http://www.ipieca.org/system/files/publications/alien_invasive_species.pdf	30.03.2016
A guide to developing biodiversity action plans	BAP	IPIECA	2005	Extractives Sector	Global	http://www.ipieca.org/system/files/publications/baps_0.pdf	30.03.2016
Biodiversity Principles - Recommendations for the Financial Sector	Biodiversity in Finance	UNEP FI	2011	Finance Sector	Global	http://www.unepfi.org/fileadmin/documents/biodiversity_principles_en.pdf	07.04.2016
Demystifying Materiality: Hardwiring biodiversity and ecosystem services into finance	Biodiversity in Finance	UNEP FI	2010	Finance Sector	Global	http://www.unepfi.org/fileadmin/documents/CEO_DemystifyingMateriality.pdf	05.04.2016

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
Biodiversity Offsets: Voluntary and Compliance Regimes	Biodiversity Offsetting	UNEP WCMC UNEP FI	2012	Finance Sector	Global	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwiPzPDQqvfLAhXBDw8KHcymC5QQFgghMAA&url=http%3A%2F%2Fwww.unepfi.org%2Ffileadmin%2Fdocuments%2FBiodiversity_Offsets-Voluntary_and_Compliance_Regimes.pdf&usg=AFQjCNHJARc-yRgd4XKksjG5NsQEktYfwA&bvm=bv.118443451,d.ZWU	05.04.2016
Private Sector Investment & Sustainable Development	Sustainability in Finance	UN GLOBAL COMPACT	2015	Finance Sector	Global	https://www.unglobalcompact.org/library/1181	07.04.2016
Various CDC Material governing their environmental and social governance: CDC ESG toolkit for fund managers, ESG Management System, Assessing Companies' Commitment, Capacity and Track Record (CCTR), Biodiversity Briefing Note etc.	Biodiversity in Finance	CDC	-	Finance Sector	Global	http://toolkit.cdcgroup.com/downloads-and-reference-materials	07.04.2016
Safeguards and Sustainability Series - Volume 1 - Issue 1	Sustainability in Finance	AFDB	2013	Finance Sector	Africa	http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/December_2013_-_AfDB'S_Integrated_Safeguards_System_-_Policy_Statement_and_Operational_Safeguards.pdf	07.04.2016
Safeguarding Biodiversity & Ecosystem Services - Towards an African Green Economy	Biodiversity in Finance	AFDB		Finance Sector	Africa	http://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/2.%20Concept%20Note_Biodiversity%20Safeguards.pdf	07.04.2016
A Good Practice Guide - Sustainable Forest Management, Biodiversity and Livelihoods	Sustainability Best Practice Examples	CBD / IUCN	2010	Forestry	Global	https://www.cbd.int/development/doc/cbd-good-practice-guide-forestry-booklet-web-en.pdf	05.04.2016
Forestry Sector and Biodiversity Conservation - Best Practice Benchmarking	Biodiversity Best Practice Benchmarking	BUSINESS @ BIODIVERSITY	2010	Forestry	EU / South Africa	http://ec.europa.eu/environment/archives/business/assets/pdf/sectors/Forestry_Best%20Pratice%20Benchmarking_Final.pdf	05.04.2016

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
Guidelines on sustainable forest management in drylands of sub-Saharan Africa	Sustainability Best Practice Benchmarking	FAO	2010	Forestry	Global	http://www.fao.org/docrep/012/i1628e/i1628e00.pdf	03.04.2016
Guidelines for the conservation and sustainable use of biodiversity in tropical timber production forests	Biodiversity Principles	ITTO/IUCN	2009	Forestry	Global	https://www.cbd.int/forest/doc/itto-iucn-biodiversity-guidelines-tropical-forests-2009-en.pdf	03.04.2016
Sustainable Forestry And The European Union	Sustainability Requirements	EUROPEAN COMMISSION	2003	Forestry	EU	http://ec.europa.eu/agriculture/publi/brochures/forestry/full_en.pdf	03.04.2016
Forests and biodiversity - UK Forestry Standard Guidelines	Sustainability Requirements	FORESTRY COMMISSION, UK	2011	Forestry	UK	http://www.forestry.gov.uk/pdf/FCGL001.pdf/$FILE/FCGL001.pdf	03.04.2016
Lessons from Latin America and Their Relevance to SFM in Africa	Sustainability Lessons Learnt	AFRICAN FOREST FORUM	2004	Forestry	Africa	http://www.afforum.org/sites/default/files/English/English_35.pdf	04.04.2016
Conserving Biodiversity Through Sustainable Forestry - A Guide To Applying NCSSF Research	Biodiversity Standards	NCSSF	2007	Forestry	US	https://www.safnet.org/publications/ncssf/NCSSF_Sustainable_Forest_Guidebook091507.pdf	07.04.2016
ICFR Guidelines Material: field guides, technical notes etc. (nothing on biodiversity really)	HSE Best Practices	ICFR	-	Forestry	South Africa	http://www.icfr.ukzn.ac.za/publications/	04.04.2016
FABI research outcomes (tree health, diseases and pests)	Biodiversity Research	FABI	-	Forestry	South Africa	http://www.fabinet.up.ac.za	04.04.2016
Tree Farming Guidelines for Private Growers	Sustainability Practices	SAPPI	2004	Forestry	South Africa	http://www.sappi.com/regions/sa/SappiSouthernAfrica/Sappi%20Forests/Tree%20Farming%20Guidelines/Part%201_Forest%20Management.pdf	07.04.2016
Mining and Biodiversity Good Practice Guidance	Biodiversity Management System	ICMM	2006	Mining Sector	Global	http://www.icmm.com/document/13	30.03.2016
Integrating Mining and Biodiversity Conservation Case studies from around the world	Biodiversity Case Study	ICMM	2010	Mining Sector	Global	http://www.icmm.com/document/1246	30.03.2016
Biodiversity Offsets - A Briefing Paper for the Mining Industry	Biodiversity Offsetting	ICMM	2005	Mining Sector	Global	http://www.icmm.com/document/25	30.03.2016

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
Planning for Integrated Mine Closure: Toolkit	Sustainable Mine Closure	ICMM	2008	Mining Sector	Global	http://www.icmm.com/document/310	30.03.2016
Water Stewardship Framework	Water Management	ICMM	2014	Mining Sector	Global	http://www.icmm.com/document/7024	29.03.2016
A Practical Guide to Catchment Based Water Management for the Mining and Metals Industry	Water Management	ICMM	2015	Mining Sector	Global	http://www.icmm.com/document/8329	29.03.2016
Identifying potential overlap between extractive industries (mining, oil and gas) and natural World Heritage sites	WHS	UNEP WCMC	2013	Mining Sector	Global		29.03.2016
Mining and Biodiversity Guideline - mainstreaming biodiversity into the mining sector	Biodiversity Management System	DEA, DMR, Chamber of Mines, South African Mining and Biodiversity Forum, and SANBI.	2013	Mining Sector	South Africa	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwi0lqLdq_XLAhXKfhoKHcdID-EQFggIMAA&url=https%3A%2F%2Fwww.environment.gov.za%2Fsites%2Fdefault%2Ffiles%2Fdocs%2Fpublications%2Fpresentation_miningbiodiversity_guideline_idb2013.pdf&usg=AFQjCNEDGkGqtp2KvDhPWltuDz9_xpQjbQ	30.03.2016
Guidelines for the Rehabilitation of Mined Land	Rehabilitation	CHAMBER OF MINES SA / COALTECH	2007	Mining Sector	South Africa	https://commondatastorage.googleapis.com/comsa/Guidelines%20for%20the%20rehabilitation%20of%20mined%20land%20Nov07.pdf	07.04.2016
Sustainable Sugarcane Initiative - Producing more with less	Sustainability Practices	AGSRI	2012	Sugar Industry	South Africa	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjAsPqUjPfLAhWEvBoKHfsiCnIQFggdMAA&url=http%3A%2F%2Fwww.agsri.com%2Fimages%2Fdocuments%2Fssi%2Fssi_manual_2012.pdf&usg=AFQjCNEQYDHsifxwkfWrtCESz41CGV6R7g	06.04.2016
Sustainable Field Guides (green manuring, soil management etc.)	Sustainability Best Practice Requirements	SASRI	VA	Sugar Industry	South Africa	To be purchased: http://www.sasa.org.za/divisions/SASugarCaneResearchInstitute/Publications.aspx	06.04.2016
Information Sheets (Gully stabilisation and repairs, Understanding and managing	Biodiversity Best Practice Requirements	SASRI	VA	Sugar Industry	South Africa	To be purchased: http://www.sasa.org.za/divisi	06.04.2016

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
wetlands for the sugarcane farmer etc.)						ons/SASugarCaneResearchInstitute/Publications.aspx	
SmartCane Riparian and Wetland Areas on Cane Farms	Wetlands Management	WETLANDCARE	2008	Sugar Industry	Australia	http://www.canegrowers.com.au/icms_docs/70447_BMP_Riparian__wetland_management.pdf	06.04.2016
New Generation Plantations Platform	Various	VARIOUS / WWF	-	Forestry	Global	http://newgenerationplantations.org	12.04.2016
Environmental Guidelines	Environmental Management	FORESTRY INDUSTRY ENVIRONMENTAL COMMITTEE	2002	Forestry	South Africa	http://www.forestry.co.za/uploads/File/industry_info/environment/1047.pdf	16.04.2016
SA Forestry Online (magazine)	various	SA FORESTRY ONLINE	-	Forestry	South Africa	http://saforestryonline.co.za/articles/ecological-networks-saving-space-for-species-in-production-landscapes/	16.04.2016
Practical Wetland Management	Wetlands Management	MONDI WETLANDS PROGRAMME	2004	Forestry	South Africa	http://www.wetland.org.za/TechnicalInfo.html	26.04.2016
Guidelines for Managing Wetlands in Plantation Forestry Areas	Wetlands Management	MONDI WETLANDS PROGRAMME	2004	Forestry	South Africa	http://www.wetland.org.za/TechnicalInfo.html	26.04.2016
Wetlands Fix - illustrated field guides on the assessment, management and rehabilitation of wetlands (6 parts)	Wetlands Management	MONDI WETLANDS PROGRAMME	1995 - 2000	Forestry	South Africa	http://www.wetland.org.za/TechnicalInfo.html	26.04.2016
Wetland Rehabilitation Manual	Wetlands Management	MONDI WETLANDS PROGRAMME	2000	Forestry	South Africa	http://www.wetland.org.za/TechnicalInfo.html	26.04.2016
Manual for the assessment of a Wetland Index of Habitat Integrity - for South African floodplain and channelled valley bottom wetland types	Wetlands Management	DWA	2007	Forestry	South Africa	https://www.dwa.gov.za/iwqs/rhp/wetlands/WETLAND_IHI_final.pdf	26.04.2016
Burning of wetlands in timber plantation areas Assessment criteria and guidelines	Wetlands Management	UNIVERSITY OF KWAZULU - NATAL and MONDI WETLANDS PROGRAMME	2010	Forestry	South Africa	http://www.midlandsconservancies.org.za/documents/fire/Wetland%20Burning%20Assessment%20Guidelines%20Nov2010_Kotze.pdf	26.04.2016
Guidelines for Delineating the Boundaries of a Wetland	Wetland Delineation	Department of Water Affairs and Forestry	2008	Cross Sectoral	South Africa	https://www.dwa.gov.za/Documents/Other/EnvironRecreation/wetlands/DRAFT_3_Wetland%20and%20Riparian	09.05.2016

Biodiversity Guidelines	Management Domain	Publisher	Year	Sector	Country / Region	Link	Link Accessed
						%20Delineation%20Guidelines%202008.pdf	
Strengthening implementation of the mitigation hierarchy: managing biodiversity risk for conservation gains	Mitigation Hierarchy	Cambridge Conservation Initiative	2015	Cross Sector	Global	http://www.birdlife.org/sites/default/files/attachments/cci_report_-_managing_risk_for_conservation_gains_-_final_-_june_9th_2015.pdf	27.06.2016
Mitigation Hierarchy: No Net Loss and Net Positive Impact (Leaflet)	Mitigation Hierarchy	Flora and Fauna	2016	Cross Sector	Global	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&ved=0ahUKEwiKwqiqg7vNAhUrC8AKHaMPAusQFgg4MAM&url=http%3A%2F%2Fwww.fauna-flora.org%2Fwp-content%2Fuploads%2FThe-Mitigation-Hierarchy.pdf&usg=AFQjCNF1RkTJO3LdoEx3puNQW--J7fJh8w&bvm=bv.125221236,d.ZGg	21.06.2016
A guide to developing biodiversity action plans for the oil and gas sector	Biodiversity Action Plan	IPIECA, OGP	2005	Oil & gas	Global	http://www.ipieca.org/publication/guide-developing-biodiversity-action-plans-oil-and-gas-sector	23.06.2016
Guideline for Environmental Management Plans	Environmental Management Plans	CSIR	2005	Cross Sector	South Africa	https://www.westerncape.gov.za/Text/2005/7/deadp_emp_guideline_june05_5.pdf	20.06.2016

Biodiversity Tool	Theme	Type of Tool	Publisher	Year	Sector	Geographic Location	Link	Link Accessed
Global Invasive Species Database	Biodiversity	Database	IUCN	N/A	Cross Sector	Global	http://www.iucngisd.org/gisd/	29.03.2016
IUCN Red List	Biodiversity	Database	IUCN	N/A	Cross Sector	Global	http://www.iucnredlist.org	29.03.2016
The Red List of South African Plants Online	Biodiversity	Database	SANBI	N/A	Cross Sector	South Africa	http://redlist.sanbi.org/index.php	29.03.2016
IUCN Red List of Ecosystems	Biodiversity	Database	IUCN	N/A	Cross Sector	Global	http://www.iucnredlistofecosystems.org/resources/assessments/	29.03.2016
Protected Planet	Biodiversity	Database (WIP)	IUCN	N/A	Cross Sector	Global	http://www.protectedplanet.net	29.03.2016
Biodiversity-(BGIS)	Biodiversity	Mapping	SANBI	N/A	Cross Sector	South Africa	http://bgis.sanbi.org	02.04.2016
Plants of Southern Africa (POSA)	Biodiversity	Database	SANBI	N/A	Cross Sector	South Africa, Swaziland, Lesotho, Botswana	http://posa.sanbi.org/searchspp.php	02.04.2016
SANBI's Integrated Biodiversity Information System (SIBIS) + South African Biodiversity Information Facility (SABIF)	Biodiversity	Information Portal	SANBI	N/A	Cross Sector	South Africa	The portals are being combined till 1 portal, and therefore website not currently accessible. http://biodiversityadvisor.sanbi.org/online-biodiversity-data/sabif-3/	02.04.2016
Land-Use Decision Support (LUDS) tool	Biodiversity	Spatial Biodiversity Info	SANBI	N/A	Cross Sector	South Africa		02.04.2016

Biodiversity Tool	Theme	Type of Tool	Publisher	Year	Sector	Geographic Location	Link	Link Accessed
Biodiversity Advisor Portal	Biodiversity	Species and Specimen Data	SANBI	N/A	Cross Sector	South Africa	http://biodiver- sityadvisor.sanbi.org	02.04.2016
SANBI recommended Modelling Software: Climex software	Biodiversity	software programmes	Hearne Scientific Software	-	Cross Sector	Global	To be purchased (about 1300 - 3000 USD): http://www.hearne.software/Software/CLIMEX-DYMEX/Pricing?product=CLIMEX-DYMEX&currency=USD&region=AF&version=Climex+and+Dymex+Suite+4.0&class=Commercial	03.04.2016
SANBI recommended Modelling Software: Hulls & Kernels software scripts	Biodiversity	software programmes	ESRI Software	2008	Cross Sector	Global	Free download: http://arcscripts.esri.com/details.asp?dbid=13046	03.04.2016
SANBI recommended Modelling Software: Bioclim	Biodiversity	software programmes	ESRI Software	2004	Cross Sector	Global	Free download: http://arcscripts.esri.com/details.asp?dbid=13745	03.04.2016
SANBI recommended Modelling Software: logistic regression	Biodiversity	software programmes	Various	N/A	Cross Sector	Global	Links to various providers a SANBI's webpage: http://biodiversityadvisor.sanbi.org/research-and-modelling/species-distribution-modelling/modelling/	03.04.2016
SANBI recommended Modelling Software: Classification and Regression Trees	Biodiversity	software programmes	Various	N/A	Cross Sector	Global	ArcView extension software. Does not work with ArcGIS. http://www.gis.usu.edu/~chrisg/avext/	03.04.2016
SANBI recommended Modelling Software: MaxEnt (Maximum Entropy)	Biodiversity	software programmes	Princeton	-	Cross Sector	Global	Free download: http://www.cs.princeton.edu/~schapire/maxent/	03.04.2016
SANBI recommended Modelling Software: BioMapper	Biodiversity	software programmes	University of Lausanne	-	Cross Sector	Global	http://www2.unil.ch/biomapper/products.html	03.04.2016

Biodiversity Tool	Theme	Type of Tool	Publisher	Year	Sector	Geographic Location	Link	Link Accessed
SANBI recommended Modelling Software: Ordination (XLSTAT)	Biodiversity	software programmes	XLSTAT	-	Cross Sector	Global	To be purchased, while has a 30 day free trial: https://www.xlstat.com/en/download	03.04.2016
SANBI recommended Modelling Software: MARS (Multivariate adaptive regression splines)	Biodiversity	software programmes	Salford Systems	-	Cross Sector	Global	Free downloads available: https://www.salford-systems.com/products/downloadspm	03.04.2016
SANBI recommended Modelling Software: presence modelling: PRESENCE and MARK	Biodiversity	software programmes	Various	-	Cross Sector	Global	SANBI: http://biodiversityadvisor.sanbi.org/research-and-modelling/species-distribution-modelling/find-data/	03.04.2016
Animal Demography Unit: Southern African Bird Atlas The Atlas of African Frogs The Atlas of African Butterflies MammalMap	Biodiversity	Mapping	University of Cape Town collaborations	N/A	Cross Sector	South Africa	http://adu.org.za	04.04.2016
Making the case for biodiversity: The biodiversity case study development toolkit	Biodiversity	communication	SANBI	2014	Cross Sector	South Africa	http://www.sanbi.org/node/9888/reference	02.04.2016
Vegetation Field Atlas of Continental South Africa, Lesotho and Swaziland	Biodiversity	Mapping	SANBI	2014	Cross Sector	South Africa	SANBI bookshop	02.04.2016
Various Biomes and	Biodiversity	Mapping	SANBI	-	Cross Sector	South Africa	SANBI - information resources	02.04.2016

Biodiversity Tool	Theme	Type of Tool	Publisher	Year	Sector	Geographic Location	Link	Link Accessed
vegetation maps								
iSpot Southern Africa	Biodiversity	Species Identification	iSpot Share nature	N/A	Cross Sector	South Africa (global	http://www.ispotnature.org/communities/southern-africa	
Species Status Database	Biodiversity	Database	SANBI	N/A	Cross Sector	South Africa	http://speciesstatus.sanbi.org	02.04.2016
Certification; ISO 14001 or OHSAS 18001	Environmental	Management System	ISO / OHSAS	N/A	Cross Sector	Global	www.iso.org www.ohsas.org	05.04.2016
Certification; NOSA 5 Star	HSE	Management System	NOSA	N/A	Cross Sector	South Africa	https://www.nosa.co.za	05.04.2016
Certification: CCB Standards	Sustainability	Standards	Climate, Community & Biodiversity Alliance (CCBA)	2013	Cross Sector	Global	https://s3.amazonaws.com/CCBA/Third_Edition/CCB_Standards_Third_Edition_December_2013.pdf The CCB Standards identify land management projects that deliver net positive benefits for climate change mitigation, for local communities and for biodiversity.	05.04.2016
Biodiversity Timeline Tool	Biodiversity	Timeline	CSBI	2013	Extractives Sector	Global	http://www.csbi.org.uk/wp-content/uploads/2015/06/Timeline_Illustrator_V03-011.jpg http://www.ipieca.org/system/files/publications/CSBI_timeline_tool.pdf	01.04.2016
Biodiversity and ecosystem services guide	Biodiversity	Risk & impact checklist guidance	IPIECA	2011	Extractives Sector	Global	http://www.ipieca.org/sites/default/files/publications/ecosystem_services_guidance_8.pdf	03.04.2016
Biodiversity and ecosystem services checklists	Biodiversity	Risk & impact checklist	IPIECA	2011	Extractives Sector	Global	http://www.ipieca.org/system/files/publications/ecosystem_services_checklists_2.pdf	03.04.2016
CDC Environmental and Social Checklist	Sustainability	Checklist	CDC Group	2015	Financial Sector	Global	http://toolkit.cdcgroup.com/downloads-and-reference-materials	06.04.2016
ARIES	Ecosystem Service	Modelling	ARIES	N/A	Financial Sector	Global	http://aries.integratedmodelling.org	07.04.2016

Biodiversity Tool	Theme	Type of Tool	Publisher	Year	Sector	Geographic Location	Link	Link Accessed
InVEST	Ecosystem Service	Modelling	Natural Capital Project	N/A	Financial Sector	Global	Free software download: http://www.naturalcapitalproject.org/invest/	07.04.2016
MIMES	Ecosystem Service	Modelling	AFFORDABLE FUTURES	N/A	Financial Sector	Global	http://www.afordablefutures.com/orientation-to-what-we-do/services/mimes	07.04.2016
SFM Toolbox which includes themes such as: - forest restoration and rehabilitation - wildlife management - REDD+	Sustainability	A collection of tools for various management decisions	FAO	N/A	Forestry	Global	http://www.fao.org/sustainable-forest-management/toolbox/tools/en/	04.04.2016
Biodiversity Screening Tool	Biodiversity	Screening	SANBI / AsgiSA-EC	2011	Forestry	South Africa	For Eastern Cape grassland and forestry sector. Can be obtained through SANBI	02.04.2016
Wet-Ecoservices	Biodiversity	wetland assessment tool	UNIVERSITY OF KWAZULU-NATAL AND MONDI WETLANDS PROGRAMME	2008	Forestry / Cross Sectoral	South Africa	http://www.wetland.org.za/TechnicalInfo.html Available on request from Water Research Commission	26.04.2016
Wet-Health	Biodiversity	wetland assessment tool	UNIVERSITY OF KWAZULU-NATAL AND SAPPI	2008	Forestry	South Africa	http://www.wetland.org.za/TechnicalInfo.html Available on request from Water Research Commission	26.04.2016
Wetland Use	Biodiversity	wetland assessment tool	UNIVERSITY OF KWAZULU-NATAL AND MONDI WETLANDS PROGRAMME	2000	Forestry	South Africa	http://www.wetland.org.za/TechnicalInfo.html	26.04.2016

Biodiversity Tool	Theme	Type of Tool	Publisher	Year	Sector	Geographic Location	Link	Link Accessed
Wetland Health and Importance Series - Tools and Metrics for Assessment of Wetland - Handbook to the WHI Research Programme	Biodiversity	wetland assessment tool	WRC	2010	Cross Sector	South Africa	http://www.wrc.org.za/Knowledge%20Hub%20Documents/Research%20Reports/TT%20433-09%20Conservation%20of%20Water%20Ecosystems.pdf	09.05.2016
IBAT - Integrated Biodiversity Assessment Tool	Biodiversity	Assessment Tool	IBAT	2015	Cross Sector	Global	https://www.ibatforbusiness.org	16.05.2016
Toolkit for Ecosystem Service Site-based Assessment (TESSA)	Ecosystem Service	Assessment Tool	Anglia Ruskin University, BirdLife, University of Cambridge, rspb, tropical apology association, UNEP, WCMC	-	Cross Sector	Global	http://tessa.tools	21.06.2016
Biodiversity Risk and Opportunity Assessment (BROA) tool	Risk & Opportunity	Assessment Tool	The British American Tobacco Biodiversity Partnership	2006	Cross Sector	Global	http://www.businessandbiodiversity.org	25.06.2016
Certification: FSC, PEFC (not available in SA). SFI (mainly northern America), SABS	Sustainability	Management System	FSC	N/A	Forestry	Global	www.fsc.org http://www.pefc.org http://www.sfiprogram.org www.sabs.co.za	05.04.2016
Sustainable Sugarcane Farm Management System (SusFarMS)	Sustainability	Management System	SASRI	-	Sugar Industry	South Africa	To be purchased from SASRI: http://www.sasa.org.za/divisions/SASugarCaneResearchInstitute/Publications.aspx	01.04.2016

Biodiversity Tool	Theme	Type of Tool	Publisher	Year	Sector	Geographic Location	Link	Link Accessed
Certification: Bonsucro	Sustainability	Standards	Bonsucro	N/A	Sugar Industry	Global	http://bonsucro.com/site/production-standard/	05.04.2016

Appendix 2: Sample Questionnaire

QUESTIONNAIRE - for a master research study on biodiversity management practices across a selection of South African companies
BIODIVERSITY GUIDELINES & SUPPORT MATERIAL 1a. What have you and/or your company found to be the most helpful or valuable institutions in providing biodiversity management guidelines and support materials for your operations in South Africa? 1b. Did biodiversity management guidelines, support materials and/or best practice examples influence your company's development of a biodiversity management system, policy, strategy, standard or procedure(s)? 1c. If so, which material was this? 1d. In the provided overview of Biodiversity guidelines material, could you indicate in the 3 columns which of these materials; 1. you have heard of previously, 2, have helped your company and/or you, 3. you found particularly useful or valuable
Answer:
BIODIVERSITY IN VALUES AND PRINCIPLES 2a. In your code of ethics or your code of conduct, is sustainability, environmental and/or biodiversity considerations mentioned? - If so, would you consider this an important element of biodiversity management? - If so, could you provide a quote of the relative text in the code of ethics? 2b. Could biodiversity be better integrated in a company's values and perspectives, and if so how?
Answer:

QUESTIONNAIRE

- for a master research study on biodiversity management practices across a selection of South African companies

BIODIVERSITY MANAGEMENT SYSTEM

3a. Do you have a separate Biodiversity Management System or is it integrated in the EMS?

3b. You have a Biodiversity Policy and Management Standard (under review), is this correct?

- Has a biodiversity policy / standard helped in improving your company's impact management, and how?
- Can a copy be shared of this policy/standard?

3c. Have you finalised your Biodiversity Offset Strategy?

- Will this strategy help in improving your company's impact management, and how?
- Were there specific institutions and/or guidelines material that was or is helpful in developing this strategy?
- Can a copy be shared of this strategy?

3d. Have you finalised your wetlands policy?

- Will this wetlands policy help in improving your company's impact management, and how?
- Were there specific institutions and/or guidelines material that was or is helpful in developing this policy?
- Can a copy be shared of this policy?

3e. Is your company considering developing other biodiversity related management material?

3f. What do you find to be the key challenges in developing a company's biodiversity management framework?

3g. Do you collaborate with other industries (such as oil and gas, forestry or agriculture) when developing biodiversity management material?

Answer:

BIODIVERSITY IN FUNDING REQUIREMENTS

4a. Does COMPANY obtain external funding and financing, and if so what were the funding institutions' requirements with regards to biodiversity management?

- Did you have to comply with IFC PS6 on biodiversity or Equator Principles?

4b. Has external finance requirements at any point resulted in COMPANY having to amend its approach to biodiversity management and/or requirements?

Answer:

QUESTIONNAIRE

- for a master research study on biodiversity management practices across a selection of South African companies

BIODIVERSITY IN RISK AND IMPACT ASSESSMENTS

Risk Assessments

5a. How are biodiversity risks incorporated in the integrated risk management framework, and would you have some practical examples of listed biodiversity related risks?

5b. As part of your integrated risk management framework, do you make use of a Biodiversity Risk Assessment Matrix?

- If so, could you explain the methodology of the assessment matrix, and would it be possible to share?
- If not, what is the current framework/methodology for assessing biodiversity risks?
- Have you found the Biodiversity Risk Matrix developed by IUCN and Holcim useful for your biodiversity risk assessments?

Impact Assessment & Mitigation

5c. Does your company make use of a specific impact assessment methodology for your biodiversity impacts (other than what would be used by the consultants in their assessments)?

5d. Does your company make use of a biodiversity mitigation hierarchy?

- If so, is this the same as the mitigation hierarchy provided in the Mining & Biodiversity Guidelines?
- If not, what is the mitigation hierarchy applied for your biodiversity impacts?
- Does a mitigation hierarchy help you better address your biodiversity impacts, and why?
- What do you find to be the challenges in applying a mitigation hierarchy for biodiversity impacts?
- Are you aware of IUCN's Biodiversity Opportunity & Mitigation Hierarchy, any thoughts on the concept of including opportunities?

Answer:

BIODIVERSITY MANAGEMENT TOOLS

6a. I saw from your website that you make use of several wetlands specific biodiversity management tools, such as

WET-Ecoserve, WET Health tools and WET-EffectiveManage tools from your website. Do you make use of other tools, and more specifically non-wetlands related biodiversity management tools?

- What are the main benefits from using these tools?

6b. Do you make use of a Biodiversity Action Plan, and if so would this(ese) be developed on an asset basis, project level or for the company as a whole?

- What do you consider to be the advantages and disadvantages of developing and implementing a biodiversity management plan

6c. Of the list provided, are there any of these biodiversity management tools that you know have been useful for COMPANY?

Answer:

QUESTIONNAIRE

- for a master research study on biodiversity management practices across a selection of South African companies

BIODIVERSITY IN INVESTMENT DECISION PROCESSES(ES)

7a. Do you have a documented assurance process in your company with regards to investments (especially large or risky investments)?

7b. If so, how are sustainability and/or environmental considerations included in this investment assurance process, and how would biodiversity related risks and impacts be included?

7c. Do you have an example of where a biodiversity related risk or impact was included in the investment assurance process, and how it may have influence the decision?

Answer:

BIODIVERSITY IN MANAGEMENT PLANS

8a. What are the main management plans or documents that govern a project development or existing operations?

8b. Would these management plan(s) specifically include sustainability, environmental and/or biodiversity considerations, and if so could you please provide some examples?

8c. How is biodiversity included in your HSE and/or Environmental Management Plan(s), and if so could you please provide some examples?

Answer:

BIODIVERSITY IN SUPPLIER REQUIREMENTS

9a. What are generally COMPANY's main concerns when managing supplier performance, i.e. what do you tend to focus on?

9b. I could not find any biodiversity specific requirements in your supplier code of conduct (while found general environmental requirements), so what are the processes and requirements of your company ensuring that suppliers manage their risks and impacts to biodiversity in a manner acceptable for your company?

9c. Would suppliers need to comply with your biodiversity policy and standards?

9d. How do you ensure that suppliers comply with biodiversity requirements, and what are the consequences if non-compliances are discovered?

9e. Does your supplier sustainability assessment include biodiversity specific requirements, and what are these?

Answer:

BIODIVERSITY IN CORPORATE ASSURANCE PROCESSES

10a. How does the company leaders and senior management ensure and verify that the company's activities are in line with company's Biodiversity principles, policies, standards and procedures, and that risks and impacts are managed adequately?

10b. Does your company have an annual assurance process, and if so how is biodiversity management incorporated?

QUESTIONNAIRE

- for a master research study on biodiversity management practices across a selection of South African companies

10c. Does your company have regular reviews or audits that incorporate biodiversity management, and have you had dedicated biodiversity management reviews or audits?

Answer:

BIODIVERSITY IN SUSTAINABILITY REPORTING

11a. Through reviewing the sustainability reports of the selected south African companies, I noticed there were quite some differences on how biodiversity was reported on, and the interpretation of the GRI guidelines. What is your view on GRI reporting requirements related to biodiversity (e.g. requirement G4-DMA, G4-EN11, G4-EN12, G4-EN13 and G4-EN14), and why do you think there are so many different interpretations?

11b. I noticed you make use of external verification of a selection of your sustainability reporting metrics, have you had external verification on your biodiversity related reporting metrics, and hen was this?

11c. In your perspective, what could South African companies do to be more transparent on their biodiversity management efforts?

Answer:

BIODIVERSITY IN STAKEHOLDER RELATIONS AND ENGAGEMENTS

12a. In your approach to biodiversity management, how do you ensure external input and feedback?

12d. For new projects, expansions and developments - how would you engage with stakeholders to better identify potential biodiversity risks and impacts?

Answer:

BIODIVERSITY IN COMPANY BENCHMARKING EXERCISES

13a. Does your company benchmark your biodiversity performance and activities against industry peers or other companies?

- If so, what are the biodiversity performance metrics benchmarked, and how is the benchmarking undertaken / analysed?

13b. If not, do you benchmark your sustainability and environmental performance and activities with industry peers?

Answer:

EXAMPLES OF IMPLEMENTATION OF BIODIVERSITY MANAGEMENT

14. Do you have examples of where biodiversity has been a key influencing factor in a business decision made by your company?

QUESTIONNAIRE - for a master research study on biodiversity management practices across a selection of South African companies
15. Do you have examples of where biodiversity has been a key influencing factor resulting in operational adjustments or amended procedures/activities?
Answer:

Appendix 3: Engagement Table with Selected Companies

	Initial Contact	1st Chase	2nd Chase	3rd Chase	Participation	Meeting Arranged	**Comment**
Mining Company	02.06.2016	27.06.2016	-	-	NO		
Mining Company	18.05.2016	02.06.2016	27.06.2016	04.07.2016	NO ANSWER		
Mining Company	27.06.2016	04.07.2016	11.07.2016	18.07.2016	NO ANSWER		
Mining Company	02.06.2016	27.06.2016	04.07.2016	11.07.2016	YES	07.09.2016	Interview by phone
Mining Company	19.05.2016	02.06.2016	27.06.2016	-	NO		Initial yes, whilst in the end questionnaire was not answered.
Forestry Company	19.05.2016	02.06.2016	-	-	MAYBE		Didn't respond in time.
Forestry Company	19.05.2016	02.06.2016	27.06.2016	04.07.2016	NO ANSWER		

	Initial Contact	1st Chase	2nd Chase	3rd Chase	Participation	Meeting Arranged	**Comment**
Sugar Company	02.06.2016	27.06.2016	04.07.2016	11.07.2016	NO ANSWER		
Sugar Company	19.05.2016	02.06.2016	27.06.2016	04.07.2016	YES	28.09.2016	Interview by phone