



# **Biodiversity offsets: Investigating the perceived benefits for conservation in South Africa**

**LM Tsoku**

 **[orcid.org/0000-0001-6280-589X](https://orcid.org/0000-0001-6280-589X)**

Dissertation accepted in partial fulfilment of the requirements for the degree *Master of Environmental Management* at the North-West University

Supervisor: Prof DP Cilliers

Graduation July 2022

27648397

## **ACKNOWLEDGEMENTS**

First of all, I give thanks to the Almighty God, the God of my forefathers. Because of His unconditional love and the strength, He gave to me, I completed this degree. I give all honour and praise to Him in Jesus name.

I would like to thank my employer, Mangaung Metropolitan Municipality, for sponsoring my degree and allowing me time off from work to focus on my study.

I would also like to thank my family for their support during my studies. Your love and support will never be forgotten, and I appreciate it.

Thank you to all the respondents in my study. Thank you for taking time to complete the questionnaires. I appreciate your support.

Thank you to AZEF, The Fynbos Forum and The Grassland Society of Southern Africa for your support and for allowing me to use your platform to circulate my questionnaires.

A million thank you to my study leader, Prof Dirk Cilliers, for his guidance throughout this study. Because of your support, I was able to complete this study. A million thank you's. May the Lord God continue Blessing you.

## ABBREVIATIONS AND ACRONYMS

<b>ABBREVIATIONS</b>	
<b>CBD</b>	Convention on Biological Diversity
<b>DFFE</b>	Department of Forestry, Fisheries and Environment
<b>DMRE</b>	Department of Mineral Resources and Energy
<b>EA</b>	Environmental Assessment
<b>EAP</b>	Environmental Assessment Practitioner
<b>EIA</b>	Environmental Impact Assessment
<b>GN R984</b>	Government Notice Regulation 984
<b>GG 38282</b>	Government Gazette 38282
<b>GG 46088</b>	Government Gazette 46088
<b>Ha</b>	Hectare
<b>IAIA</b>	International Association for Impact Assessment
<b>IEM</b>	Integrated Environmental Management
<b>NEMA</b>	National Environmental Management Act (107 of 1998)
<b>NEMPAA</b>	National Environmental Management Protected Areas Act (53 of 2003)
<b>NGO</b>	Non-Governmental Organisation
<b>NNL</b>	No net Loss
<b>S &amp; EIR</b>	Scoping and Environmental Impact Report

## **ABSTRACT**

Biodiversity offsets can be defined as conservation actions that compensate for residual significant, adverse, and unavoidable impacts of proposed developments on biodiversity and have been widely applied in South Africa. Biodiversity offsets are applied as a last resort and aim to ensure a 'no-net loss' of biodiversity. The potential benefits of biodiversity offsets for biodiversity conservation have long been promoted in literature, however, very few studies have been done concerning the manner and extent to which these benefits have been realised in practice. The aim of this study is, therefore, to investigate the benefits of biodiversity offsets for conservation and explore the manner in which these benefits are being realised. To achieve the aim a questionnaire was developed and administered to individuals with experience in biodiversity offset projects in South Africa and included both government officials and environmental consultants active in the field of biodiversity offsetting. The questionnaire explored perceptions on the benefits of biodiversity offsets for conservation of biodiversity in South Africa. Responses were transcribed and analysed to identify key themes. The findings suggest that biodiversity offsets can offer numerous benefits for conservation and that some are being realised, though challenges such as a policy vacuum, lack of enforcement, lack of capacity, lack of long-term financing and resources exist.

**Keywords: Biodiversity, Biodiversity Offsets, no-net loss, benefits, conservation, natural resources**

# TABLE OF CONTENTS

ACKNOWLEDGEMENTS .....	i
ABBREVIATIONS AND ACRONYMS .....	ii
ABSTRACT.....	iii
LIST OF TABLES.....	vii
LIST OF FIGURES .....	vii
CHAPTER 1.....	1
1. INTRODUCTION .....	1
1.1. BACKGROUND.....	1
1.2. AIM AND OBJECTIVE OF THE STUDY .....	3
1.3. STRUCTURE OF THE REPORT.....	3
1.4 CHAPTER SUMMARY .....	4
CHAPTER 2.....	5
2. RESEARCH DESIGN AND METHODOLOGY .....	5
2.1. INTRODUCTION .....	5
2.2. RESEARCH DESIGN.....	5
2.3. DATA CAPTURING .....	6
2.3.3 Study area.....	8
2.4. THEMATIC ANALYSIS.....	8
2.5. ETHICAL CONSIDERATIONS .....	10
2.6. LIMITATIONS .....	11
2.7. CHAPTER SUMMARY .....	11
CHAPTER 3.....	12
3. LITERATURE REVIEW.....	12
3.1. INTRODUCTION .....	12
3.2. IMPORTANCE OF BIODIVERSITY .....	12
3.3. BIODIVERSITY LOSS.....	13
3.3.1. Habitat destruction .....	13
3.3.2. Alien invasive species.....	14
3.3.3. Overexploitation of resources.....	15
3.3.4. Pollution.....	15
3.3.5. Climate Change .....	16

3.4.	BIODIVERSITY CONSERVATION IN SOUTH AFRICA.....	16
3.4.1.	Biodiversity Offsets in South Africa .....	17
3.4.2.	Principles of Biodiversity Offsets .....	19
3.4.3.	When to Offset? .....	20
3.5.	BIODIVERSITY OFFSETS: SOUTH AFRICA'S LEGISLATIVE FRAMEWORK .....	23
3.5.1.	The Constitution.....	23
3.5.2.	NEMA and The NEMA Principles.....	23
3.5.3.	EIA Regulations and Listing Notices .....	24
3.5.4.	International Biodiversity Treaties and Agreements .....	26
3.6.	BIODIVERSITY OFFSET AND CONSERVATION: ARE THERE ACTUAL BENEFITS? 27	
3.7.	CHAPTER SUMMARY .....	28
	CHAPTER 4.....	29
4.	RESULTS AND DISCUSSION.....	29
4.1.	Introduction.....	29
4.2.	Potential benefits of biodiversity offsets for conservation .....	31
4.2.1.	Long-term Biodiversity Conservation.....	31
4.2.2.	Expansion of protected area estate.....	32
4.2.3.	Ecosystem services .....	33
4.2.4.	Sustainable development.....	33
4.2.5.	Economic benefits to conservation.....	34
4.3.	ACTUAL REALIZED BENEFITS OF BIODIVERSITY OFFSETS FOR CONSERVATION .....	35
4.3.1.	Preserve biodiversity and habitats .....	36
4.3.2.	Expansion of protected area estate.....	36
4.3.3.	Economic benefits.....	37
4.4.	BRIDGING THE GAP BETWEEN POTENTIAL AND REALIZED BENEFITS .....	38
4.4.1.	National Offset Policy.....	39
4.4.2.	Government support and legal enforcement .....	40
4.4.3.	Capacity of competent authorities and consultants .....	40
4.4.4.	Stakeholder involvement.....	41
4.4.5.	Biodiversity Offset register .....	42
4.4.6.	Conservation banking .....	43
4.5.	ARE BIODIVERSITY OFFSETS EFFECTIVE IN SOUTH AFRICA? .....	44
4.5.1.	Effective offset projects.....	45

4.5.2.	Poor offset projects.....	45
4.6.	CHALLENGES AFFECTING BIODIVERSITY OFFSETS IN SOUTH AFRICA.....	46
4.6.1.	Legal barrier (National Policy & Guidelines).....	47
4.6.2.	Capacity, monitoring and enforcement.....	48
4.6.3.	Financing.....	49
4.6.4.	Location.....	49
4.7.	CONTRIBUTION OF BIODIVERSITY OFFSETS FOR CONSERVATION EFFORTS IN SOUTH AFRICA.....	50
4.8.	DISCUSSION.....	51
4.8.1.	In your own opinion, what are the potential benefits of biodiversity offsets for conservation?.....	52
4.8.2.	In your own opinion, what are the actual realized benefits of biodiversity offsets for conservation?.....	52
4.8.3.	In your own opinion, what needs to be done to effectively bridge the gap between potential and realized benefits?.....	53
4.8.4.	What is your opinion on the effectiveness of biodiversity offsets projects in South Africa? 54	
4.8.5.	In your own opinion, what are the challenges affecting the successful implementation of biodiversity projects in South Africa?.....	54
4.8.6.	In your experience, has biodiversity offsets contributed to the conservation effort in South Africa?.....	56
4.9	CHAPTER SUMMARY.....	56
CHAPTER 5.....		57
5.	OVERVIEW, SIGNIFICANCE OF THE STUDY, SUMMARY OF FINDINGS, LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS.....	57
5.1	INTRODUCTION.....	57
5.2	OVERVIEW OF THE STUDY.....	57
5.3	SIGNIFICANCE OF THE STUDY.....	58
5.4	SUMMARY OF FINDINGS.....	58
5.5	LIMITATIONS OF THE STUDY.....	59
5.6	CONCLUSIONS.....	59
5.7	RECOMMENDATIONS.....	60
5.7.1	National Policy for biodiversity offsets.....	60
5.7.2	Long term management and monitoring of offset Sites.....	61
5.7.3	Capacity building.....	61
5.7.4	Funding.....	62

5.7.5 Public Involvement .....	62
5.7.6 National Biodiversity offset register .....	62
REFERENCES .....	63
APPENDIX.....	a
Link to Online Questionnaire .....	a
Questionnaire.....	b

## LIST OF TABLES

Table 1: Structure of the dissertation.....	3
Table 3. 1: International Treaties and Agreements.....	26
Table 4. 1: Demographic information of respondents .....	30
Table 4. 2: Conservation Banking mechanisms in other countries.....	44

## LIST OF FIGURES

Figure 3. 1: <b>The mitigation hierarchy (Source: Ezemvelo KZN Wildlife. 2010)</b> .....	22
Figure 4. 1: Potential benefits of Biodiversity offsets	31
Figure 4. 2: Realized benefits of biodiversity offsets	35
Figure 4. 3 <i>Bridging the gap between potential and realized benefits of biodiversity offsets</i>	39
Figure 4. 4: <i>Effectiveness of biodiversity offsets</i>	46
Figure 4. 5: <i>Challenges affecting BO in South Africa</i>	47
Figure 4. 6: <i>Contribution of biodiversity offsets for conservation efforts in South Africa</i>	51

# CHAPTER 1

## 1. INTRODUCTION

In this section, the background of this study is provided in order to provide the reader with the rationale behind conducting this research. This section also addresses the aim as well as the objectives of this research, and concludes by outlining the structure followed in conducting this study.

### 1.1. BACKGROUND

Conservation of biodiversity and natural resources has become a priority of many national governments and affected stakeholders globally, with a lot of funds being spent in the name of biodiversity conservation. Although the term ‘conservation’ can be defined in many ways, one widely accepted understanding is that it refers to “*the management of human use of the biosphere so that it may yield the greatest sustainable benefit to current generations while maintaining its potential to meet the needs of future generations*” (Redford & Richter, 1999:1247). Section 24 (b) of the Constitution of South Africa (RSA, 1996) also advocates for the sustainable use of natural resources for the benefit of future generations. The conservation of biodiversity can be linked to many benefits for communities across the globe, for example, poverty alleviation and job creation (Mnisi, 2020; SANBI, 2018, Skowno *et al.*, 2019), as well as addressing the effects of climate change through conserving habitats that are contributing to the reduction of carbon dioxide released into the atmosphere (IUCN, 2010).

South Africa is regarded as one of the most biologically diverse countries due to its species richness and endemism and its diversity of ecosystems (DEA, 2014). The term ‘Biodiversity’ refers to “*the natural variety and variability among living organisms, the ecological complexes in which they naturally occur, and the ways in which they interact with each other and with the physical environment*” (Redford & Richter, 1999:1247). The human footprint on this planet is currently threatening biodiversity across the different habitats (Supple & Shapiro, 2018). As a result, conserving this global biodiversity alongside economic development has remained a key challenge in many developing countries, including South Africa (Bull *et al.*, 2013). Biodiversity has and continues to decline at an “unprecedented” and “alarming” rate over the years due to anthropocentric activities such as agriculture, infrastructure, housing and industrial development (De Witt *et al.*, 2019). This led to undesirable outcomes such as habitat destruction,

fragmentation, disturbance of ecosystems and species loss. Driver *et al.* (2012) estimate that South Africa is home to 95 000 known species of fauna and flora, which according to DEA (2014), represents 10% of the plant species globally and 7% of the reptile, bird and mammal species. However, South Africa's biodiversity is currently at significant risk. According to the National Red List Index, 10% of South African birds and frogs; 20% of mammals; and 13% of plants are endangered (Raimondo, 2011; IUCN, 2012; NBA, 2018).

Realizing the need for conservation and noticing an increasing pressure on ecosystems due to anthropocentric activities (Grimm & Köppel, 2019), several methods were employed globally to assist in the conservation of biodiversity. The IUCN recommended in 1992 that its member states set aside a minimum of 10 % of their landscapes, ecosystems and communities under formal protection. The goal is to achieve representative samples of biodiversity that can be proclaimed as protected areas. The IUCN (1992) recommendations led governments worldwide to adopt various policy approaches and introduce instruments to protect ecosystems and halt, or at least reduce, the decline of biodiversity.

South Africa's biodiversity status indicated in the National Biodiversity Assessment report (NBA, 2018) currently reflects that two-thirds of the country's ecosystems and 63% of fauna species are currently being protected (Skowno *et al.*, 2019). One of the instruments introduced to further assist in protecting the country's biodiversity is biodiversity offsets. This instrument has emerged over the years as a popular conservation instrument for delivering a form of compensation for biodiversity loss with an overall outcome of 'no net loss' or even 'net gain' from development and other human-related activities (Brownlie *et al.*, 2013; De Witt *et al.*, 2019). Biodiversity offsets are defined as "*conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects to ensure no net loss of biodiversity*" (ten Kate *et al.*, 2004) and are implemented as a last resort in the mitigation hierarchy during an environmental impact assessment process (De Witt, 2015). The recently published National Biodiversity Offset Guideline (GG- 46088 of March 2022), states the following; "*EA holders are responsible for covering all of the costs of a biodiversity offset. These include the costs of securing and protecting a suitable biodiversity offset site, establishing the biodiversity site, rehabilitating or restoring it, and managing it effectively for at least a 30-year period or for the duration of the authorised activity, whichever is longer*".

The implementation of biodiversity offsets can be traced as far back as the 1970s in Europe and the United States as part of the Ramsar Convention (1972), which recommended compensation for damage to biodiversity (Hrabanski, 2015). Although South Africa has succeeded over the years in protecting its ecosystems and species (Skowno *et al.*, 2019), the contribution of biodiversity offsets in this regard is largely unknown. According to many experts in the field (Brownlie & Botha, 2009; Brownlie *et al.*, 2013; Gardner *et al.*, 2013; Jenner & Balmforth, 2015; Lukey *et al.*, 2017; De Witt *et al.*, 2019), this is because biodiversity offsets as an instrument is still relatively new in South Africa and have not been thoroughly researched.

## 1.2. AIM AND OBJECTIVE OF THE STUDY

In this study, the main aim and objective therefore, is to investigate the perceived benefits of biodiversity offsets for conservation in South Africa through the opinions of various role players and experts in the field. The following three key questions inform the aim and objective of the research:

1. What are the potential benefits of biodiversity offsets for conservation?
2. What are the actual realized benefits of biodiversity offsets for conservation?
3. What needs to be done to effectively bridge the gap between potential and realized benefits?

## 1.3. STRUCTURE OF THE REPORT

This section briefly outlines the structure of the dissertation. The overall study consists of 5 chapters, as illustrated in Table 1 below.

Table 1: Structure of the dissertation

Chapters	Description
Chapter 1	This chapter discusses the study's statement by introducing the topic of conservation and biodiversity loss and briefly describing the aim of the study.
Chapter 2	This chapter outlines the methodology employed to address the aim of the study.
Chapter 3	This chapter reviews the literature available on the topics of conservation, biodiversity and biodiversity offsets, both in South Africa and across the globe.

Chapter 4	This chapter provides a detailed discussion of the results from the analysis.
Chapter 5	This chapter concludes the study and provides recommendations based on the findings from this study

**1.4 CHAPTER SUMMARY**

This Chapter has provided a synopsis of the dissertation by highlighting the steps that will be followed in conducting this research. The Chapter also provided background information on the topic of interest as well as the aim and objective of this research. In Chapter 2, the study presents the methodology employed to address the aim and objective of this study.

## CHAPTER 2

### 2. RESEARCH DESIGN AND METHODOLOGY

#### 2.1. INTRODUCTION

In this chapter, a detailed discussion around the research design and methodology employed in the research is provided. The relevant information concerning the research design adopted; the techniques used for collecting data; the sample used; and the steps used for analysing data, is provided.

#### 2.2. RESEARCH DESIGN

Durrheim (2006) describes a research design as a strategic framework that serves as a bridge between the research questions and the implementation or execution of the research. Research design provides a context or a plan of action within which a study is to be conducted, from collecting data to analysing the data collected. A proper and sound research design aims to produce credible results for the study (McMillan & Schumacher, 2001). A research design usually follows one of the following three approaches: qualitative, quantitative and mixed-method.

Qualitative research is a research design that relies on the development of theories and understanding, whereby the results are not experimentally examined or measured (Denzin & Lincoln, 2005). Qualitative research is further defined by Cooper and Schindler (2014:144) as “*an array of interpretive techniques which seek to describe, decode, translate, and otherwise come to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world*”. The data collected from qualitative research is mainly based on meanings expressed in words and images, and the analysis of such data is conducted by using conceptualization (Saunders *et al.*, 2016). Qualitative research design includes interviews, structured and semi-structured questionnaires and observations (Ladner, 2017).

Quantitative research is particularly relevant when quantitative measures of variables are made (Queirós *et al.*, 2017). Quantitative research uses structured procedures and statistical tools to collect and analyse data. This type of research design follows the use of numbers and statistics to interpret the findings of a study (Almalki, 2016).

Finally, a mixed-method research design combines both qualitative and quantitative methods (Creswell, 2009). According to Morgan (1998), the reason for a mixed-method research design is to bring together the strengths of both the qualitative and quantitative research designs in order to validate results. This enables the researchers to enrich their findings in ways that one method does not allow.

Akhtar (2016) list questions that need to be addressed first before selecting a suitable research approach for a study: “*what is the study about and, what type of data is required; what is the purpose of study, what are the sources of needed data, what time, approximately, is required for the study, what type of sampling should be used, what method of data collection would be appropriate and how will data be analysed*”. As this research aims to explore the perspectives of different stakeholders on the benefits that offsetting may offer conservation, a qualitative research approach was deemed most suitable. The following sub-sections discuss the steps for the method selected in this study.

## **2.3. DATA CAPTURING**

### **2.3.1. Sampling process**

The proper selection of respondents for this study was vital and important as respondents had to have experience in biodiversity offsets. Purposeful sampling (Longhurst, 2003; Suri, 2011) was therefore used to identify respondents for this study. The process for selecting respondents involved focusing on individuals from relevant departments at different spheres of government, private environmental consulting companies as well as non-governmental organizations and scientific societies. As respondents were identified they were also asked to recommend more experts who might be interested in being part of the study. In this way an effort was made to identify the key role players in the field of biodiversity offsetting in South Africa. In terms of government, the national and provincial environmental departments were the main targets for this study as they are responsible for granting environmental authorisations for developments and approving possible offsets. Their role in biodiversity offsets includes but is not limited to enforcement, monitoring and attaching conditions to development projects.

Biodiversity offsets is a relatively new concept in South Africa, and not all relevant government departments have had exposure to offsets. The research then focused mainly on the provinces with draft policies on biodiversity offsets (Gauteng, Kwazulu-Natal and Western Cape) as well as national government.

In addition to government departments a search for participants was conducted through the internet. This was done to identify scientific articles compiled in South Africa on biodiversity offsets and projects implemented in the different provinces. Several individuals with relevant experience in biodiversity offsets were then identified through the search and contacted. Relevant scientific societies such as the Fynbos Forum and The Grassland Society of Southern Africa were also contacted to help identify individuals with experience in offsetting.

All individuals identified were requested to participate in the study via email. A questionnaire was sent out to which they could respond in their own time (Appendix A). The questionnaire is discussed next.

### **2.3.2. The questionnaire**

A questionnaire contains a list of questions specially addressed to a selected number of subjects to gather information regarding their views on a particular topic of interest to gather information for a survey (Wilkinson & Birmingham, 2003). The questionnaire for the research comprised five open-ended questions, supplemented by one closed-ended question. This was done deliberately to enable respondents, through open-ended questions, to provide in-depth perspectives based on their experiences concerning biodiversity offsets in South Africa. Schonlau *et al.* (2021) state that using open-ended questions in a questionnaire are important because open-ended questions do not limit respondents' answers and can encourage the respondents to elaborate more and give accurate information, therefore providing the researcher with in-depth understanding and insights. On the other hand, a closed-ended question can be answered with a 'yes' or 'no' answer and do not provide the respondent with an opportunity to elaborate further on their answer.

The first section of the questionnaire aimed to capture respondents' demographic information, employment status, and level of experience in biodiversity offsets. This was followed by a second section comprising five open-ended questions and one closed-ended question with a request for clarification. These questions were designed to capture the perception of respondents towards biodiversity offsets:

1. In your own opinion, what are the potential benefits of biodiversity offsets for conservation?
2. In your own opinion, what are the actual realized benefits of biodiversity offsets for conservation?

3. In your own opinion, what needs to be done to effectively bridge the gap between potential and realized benefits?
4. What is your opinion on the effectiveness of biodiversity offsets projects in South Africa?
5. In your own opinion, what are the challenges affecting the successful implementation of biodiversity offsets projects in South Africa?
6. In your experience, has biodiversity offsets contributed to the conservation effort in South Africa? (Yes/No). Please elaborate and provide examples where possible.

### **2.3.3 Study area**

This study was conducted in South Africa. The main target group was the various relevant government departments at all spheres of governance, tasked with implementing and monitoring of biodiversity offset projects. Seeing that most of the offsets projects are initiated and funded by the developers through their environmental consultants as part of their applications for developments, the study also included the various private environmental consultants with relevant experience in biodiversity offsets.

### **2.3.4 Distribution of questionnaires**

The questionnaire was designed and set up in Google Forms. This online questionnaire was emailed to identified individuals during May 2021. Twenty-five (25) responses with viable information for analysis were received. A sample of 25 was accepted for this study given the qualitative nature of the study and considering that an extensive effort was made to identify as many as possible key role-players in the field of offsetting.

## **2.4. THEMATIC ANALYSIS**

Data were analysed through thematic analysis, which is a method for analysing qualitative data (Braun & Clarke, 2006). It involves identifying, analysing, and reporting the repeated patterns or themes found within the data collected. According to Brown and Clarke (2006), a theme captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set.

Analysing qualitative data requires understanding how to make proper sense of the text to answer the research questions (Creswell, 2012). The process of analysing data for this research followed

the following steps: transcribing and reading raw data; data reduction; coding; and finally, data display. These steps are discussed below.

### **Step 1: Transcribing and reading raw data**

The data from the questionnaires were received through Google Forms. The respondents also had the option of sending their responses via email. The responses to each question from the questionnaire were copied individually into a Microsoft Word document. Parts of the text that talked to the aim of the research were highlighted and grouped under each question in the questionnaire. This process was done to allow further reading of the data collected and to organise responses. Repeated data reading was vital in this stage to better identify similarities or patterns before assigning codes. Alhojailan (2012) states that reading the data multiple times is beneficial based on the following reasons:

- It allows the research to get the full picture of the data, correlating the respondents' thoughts, ideas and the data collected.
- Reading the data before analysing allows the research to identify and have more time to evaluate the data, therefore preventing errors in the conclusions.

Once the transcribing process was concluded, the next step involved reducing the data collected.

### **Step 2: Data reduction**

Data reduction was the second step in the stage of analysing data for the research. Miles and Huberman (1994:11) define data reduction as *"a form of analysis that sharpens, sorts, focuses, discards, and organizes data in such a way that a "final" conclusion can be drawn and verified."* Alhojailan (2012) emphasizes that the process of data reduction needs to be carried out in such a manner that conclusions are drawn and verifications are completed.

Once the responses were read multiple times, parts of the text that captured meaning and had extracts relevant to the aim of the study were highlighted and transcribed further. From this process, the themes representing the whole text were created. It must be noted that themes were created to represent the responses to each question in the questionnaire. Validating the themes was important in this stage of data analysis. This was done through reading the responses from respondents and the sentences highlighted to ensure that they represent the whole of the text (Miles & Huberman, 1994). The next step was to export the themes into a Microsoft Excel spreadsheet and assign codes.

### **Step 3: Coding**

Friese (2014) defines 'coding' as a systematic process of allocating a code or label to a relevant data extract or a theme. Text data are dense data (Creswell, 2015) and sorting this kind of data out can be time-consuming. Coding provides a way for indexing and mapping data to allow the researcher to make sense of the data in relation to the research questions (Elliot, 2018). The research used numbers to represent the themes generated. These numerical codes represented the exact text or themes extracted from the responses to the questionnaires. The initial themes were evaluated further before deciding on the final coding for each theme. Similarities between the themes were checked, and themes that conveyed similar information were grouped together and assigned one numerical code. Once the coding process was concluded, the next step was to display the data analysed under the identified themes.

### **Step 4: Data display**

Data displaying was the final stage in the data analysis process for the research. This stage followed the validating and condensing of all the codes for the different themes. The numerical codes representing the themes were exported into a Microsoft Excel spreadsheet, and their frequency was calculated. The higher frequency of the codes meant that the theme appeared many times in the responses of the different respondents. For example, when eight respondents discussed 'Expansion of Protected Area Estate' as a realised benefit that biodiversity offsets provide, then the graph will indicate that this theme has a frequency of eight mentions. The graphs designed were colour-coded to aid in the discussions of the analysis results. Some of the information from the data collected, for example, the demographic information of respondents, was presented in tables. The results of the data analysis are discussed in Chapter 4.

## **2.5. ETHICAL CONSIDERATIONS**

The protection of the rights of the respondents formed the necessary foundation for conducting this study. This included aspects such as informed consent, anonymity and confidentiality. The ethics committee of North-West University (NWU) was consulted before conducting the study. Approval was granted for the study under ethics number (NWU: 0 0 4 7 9 - 2 1 - A 9). During the process of recruiting participants, the potential participants were given full details regarding the study and enough time to decide whether or not they would participate in the study.

## **2.6. LIMITATIONS**

Online questionnaires do not provide an opportunity for a face-to-face conversation with respondents, and as a result, care had to be taken when interpreting the responses.

## **2.7. CHAPTER SUMMARY**

This chapter discussed the research design and the methodological approach employed in the study. The data capturing process, as well as purposeful sampling of participants, were discussed. The data for the study was collected using the online questionnaire through Google Forms and via email correspondence to the identified respondents. Thematic analysis through formulating and coding themes was the preferred method for analysing the data collected. The chapter concluded by addressing the limitations and ethical considerations for the study. The results obtained through applying the above method will be discussed further in chapter 4 of the study. The following chapter reviews the literature relevant to the topic of the study.

## CHAPTER 3

### 3. LITERATURE REVIEW

#### 3.1. INTRODUCTION

In this chapter, literature on biodiversity and conservation is reviewed. The different laws and policies relating to the conservation of biodiversity, both in South Africa and globally, and the conservation approaches implemented in South Africa, are also discussed. The chapter further focuses on the concept and theory of biodiversity offsets and its contribution to conservation efforts in South Africa.

#### 3.2. IMPORTANCE OF BIODIVERSITY

Rands *et al.* (2010:1298) define biodiversity as “*the variety of genes, species, and ecosystems that constitute life on Earth, providing benefits and numerous essential services to both humans and the ecosystems in general*”. Biodiversity can, therefore, be understood as all living organisms on earth on which we as humans depend for our survival. Biodiversity plays a very important role in human survival in South Africa and globally in areas such as agriculture, science and medicine, industrial materials, ecological services, leisure, and cultural, aesthetic and intellectual value (CBD, 2014; Foley *et al.*, 2018). A study by Starke (2004) estimated that at least 40% of the world’s economy is dependent on biological products and processes. In South Africa alone, 418 000 biodiversity-related jobs were created, and the biodiversity-based tourism industry is worth over R30 billion annually (NBA, 2018).

South Africa is known for its exceptional biodiversity, comprising a wide variety of ecosystem types, high species richness and high levels of endemism rich biodiversity (Klopper *et al.* 2002; NBA, 2018; De Witt *et al.*, 2019). The country is considered the third most biologically diverse country globally (Mittermeier & Mittermeier 1997). South Africa’s biodiversity provides a wide range of benefits to society, the economy, and human well-being (NBA, 2018). Mnisi (2020) linked biodiversity with poverty alleviation both in South Africa and worldwide through sustainable ecosystem services. Rural communities in many parts of the world, South Africa included, have developed dynamic relations with nature, which they depend on as a source of material services and goods (Cuni-Sanchez *et al.*, 2016). Nature's benefits rely on intact ecosystems, healthy

species populations, and genetic diversity (NBA, 2018). As the global population grows, pressures and demands on biodiversity and natural resources increase, leading to the loss of important biodiversity globally.

### **3.3. BIODIVERSITY LOSS**

Humanity is a major contributing factor to the rapid loss of biodiversity and, with it, Earth's ability to support complex life (Bradshaw *et al.*, 2021). Biodiversity loss has been recognized as a global and local problem of increasing magnitude (Foley *et al.*, 2018:48). Therefore, the need to increase the amount of land demarcated for biodiversity conservation has gained attention globally and in South Africa (Sinthumule, 2017). The CBD (2019) defines biodiversity loss as the loss of important components of biodiversity, including biomes, habitats and ecosystems, species and populations, and genetic diversity. Biodiversity loss is a reduction in the variety of life on Earth. According to the CBD, many of the primary threats to biodiversity loss are related to human activities, especially development activities, a notion that is confirmed by Young *et al.* (2007), who argues that economic growth is at the root of biodiversity loss. The CBD (2019) lists the following as major drivers of biodiversity loss globally: habitat destruction, the introduction of alien species, overexploitation of natural resources, pollution and climate change. These drivers were also listed in the National Biodiversity Assessment report (NBA, 2018) as the primary contributors to the rapid decline in South Africa's biodiversity. The section below briefly discusses the drivers of biodiversity loss globally and in South Africa.

#### **3.3.1. Habitat destruction**

Habitat destruction has been cited as one of the main drivers of biodiversity loss globally (Skowno, 2020) and in South Africa (NBA, 2018). People's growing demand for resources is rapidly eroding natural habitats (Watson *et al.*, 2016b). This has led to an irreplaceable loss of biodiversity and important habitats globally and in South Africa (Arlidge *et al.*, 2018; Hoffmann *et al.*, 2010). Among the activities responsible for this rapid eroding of natural habitats, agriculture, infrastructure development, and mining are at the forefront (NBA, 2018; Skowno, 2020). All three of these activities are particularly relevant in South Africa as agriculture is important for achieving food security goals; infrastructure development (which includes both urban and transport network development) is important for ensuring that basic human needs are met, and mining is central to the country's economic growth. It can, therefore, be reasonably expected that these impacts will

not decrease over time but more likely increase. If not managed, these activities can adversely affect biodiversity until certain species may be lost (Gaston & Spicer, 2013; Bradshaw *et al.*, 2021; Tilman *et al.*, 2017; Komape, 2019).

### **3.3.2. Alien invasive species**

Alien invasive species are classified as one of the main threats to global biodiversity. According to the NBA (2018), over 100 alien species severely impact South Africa's biodiversity and, in some cases, human wellbeing also. Seebens *et al.* (2017) indicate that the number of new species introduced to areas outside their natural range has grown at an unprecedented pace, among all taxonomic groups, and on all continents, with no sign of slowing down. Most of these species were introduced into new areas by humans for three general reasons: accidental introductions, often invertebrates and pathogens; species imported for a limited purpose which then escape; and deliberate introductions, mainly plants and vertebrates (McNeely, 2001). South Africa has a long history of introducing alien species. For example, tree species such as *Vachellia*, Eucalypts and Pines were introduced commercially (van Wilgen & Richardson, 2014).

Although South Africa has measures in place for managing alien invasive species (Richardson *et al.*, 2011), their threat to the country's biodiversity and economic development has been noted (Moshobane *et al.*, 2019; Mashobane *et al.*, 2020). The DEFF's Working for Water Programme report pointed out that alien invasive species are costing South Africa's economy billions of Rands every year. The country's water and food security are negatively impacted.

According to NBA (2018:50), a wide range of woody invasive plant species impact riverine areas, wetlands and mountain catchments in particular and cause severe declines to South Africa's indigenous plants and freshwater animals. For example, the expansion of pines into the unique Fynbos habitat and breeding area for the Critically Endangered Rough Moss Frog (*Arthroleptella rugosa*) on the Caledon Swartberg Mountains in South Africa's Western Cape Province and a decline in population size of the Gamtoos River Redfin (*Pseudobarbus swartzi*), which has lost much of its range due to predation by Black Bass species (*Micropterus spp.*) and the African Sharptooth Catfish (*Clarias gariepinus*). NBA (2018) further highlights that alien invasive trees and shrubs can reduce surface water resources by 3–5%, threatening up to 30% of the water supply of cities like Cape Town and Port Elizabeth. Alien invasive plants are known to reduce the

capacity of natural rangelands to support livestock production, thereby affecting rural livelihoods and food production (NBA, 2018).

### **3.3.3. Overexploitation of resources**

Humans have relied on biodiversity for many years for their survival. An increase in population numbers has led to increased demand for natural resources, a significant factor in biodiversity loss (de Souza & Prevedello, 2020). Reducing the rate of exploitation of natural resources is crucial to ensuring that biodiversity is conserved and protected. Unfortunately, this has proven problematic in many developing countries, especially in Africa, where communities are still relying on natural resources for their survival (Mnisi, 2020). Examples of biodiversity overexploitation across the globe include but are not limited to the following: bush meat overconsumption in the Congo Basin (de Oliveira *et al.*, 2011), illegal hunting (poaching, for example) and illegal trade of wild species of fauna and flora in many countries globally and in South Africa (CITES, 2010) and overutilization of natural rangelands (NBA, 2018). The overexploitation of resources has direct pressure on terrestrial species and ecosystems and indirect pressure on inland aquatic ecosystems (NBA, 2018), and this can lead to sudden and unexpected ecological changes that degrade the resilience and ecosystem services of many environments and can substantially reduce food security (Campos-Silva, 2017).

### **3.3.4. Pollution**

Different forms of pollution affect biodiversity and ecosystem services throughout the globe. Waste from mining, agriculture, industry and urban settlements causes water, soil and air pollution that affect ecosystems, species and ecosystem processes (NBA, 2018). A study by de Oliveira *et al.* (2011) indicated a significant link between air pollution and loss of biodiversity. The study estimated that over 1300 species of fauna and flora in Europe alone were being threatened due to acid deposition resulting from fossil fuel burning. South Africa is no exception; the country relies on coal as an energy source and, as a result, produces large amounts of greenhouse gases. Due to toxic pollutants and eutrophication, water pollution has impacted biodiversity in coastal and inland water ecosystems (SCBD, 2010; Reynolds & Ryan, 2018). Human activities continue to be the primary source of pollution (air, land, water) and have negatively impacted the environment, biodiversity and ecosystem services.

### **3.3.5. Climate Change**

Climate change is one of the documented threats that has already shown a noticeable impact on biodiversity and natural ecosystems (Sintayehu, 2018) and also encouraged other pressures such as competition with invasive species, disease, habitat loss and habitat degradation, which have been noted in South African ecosystems over the last few decades (NBA, 2018).

Zhong and Wang (2017) state that loss of biodiversity due to climate change has, directly and indirectly, changed the patterns and dynamics of energy flow and material circulation. This has dramatically affected the natural ecosystems and ecosystem service (Sintayehu, 2018), resulting in a decline in species diversity and abundance. In South Africa, for example, climate change has impacted the population of the Cape Rockjumper (*Chaetops frenatus*), which is declining due to its range shrinking and the corals whitening due to increased temperatures of the seas (NBA, 2018). According to Thomas *et al.* (2004), climate change could result in the extinction of more than a million terrestrial species of both fauna and flora in the next 50 years. The dramatic shifts in the geographical distributions, as well as the decline in species diversity and abundance due to climate change, has been well documented in literature both globally and in South Africa (Bellard *et al.*, 2012; Sintayehu, 2018; Foden *et al.*, 2013; Midgley *et al.*, 2002; Akcakaya *et al.*, 2014; Bland *et al.*, 2015; Pacifici *et al.*, 2015; Habibullah *et al.*, 2021).

## **3.4. BIODIVERSITY CONSERVATION IN SOUTH AFRICA**

Due to the threats discussed and the value of biodiversity, conservation has become increasingly important and has become a primary concern for governments, NGOs, and the public (Hilborn & Sinclair, 2021). The degradation of natural areas, both terrestrial and marine, affects the planet's ability to support and sustain life, and as a result, millions of species globally are currently facing extinction (Kubiak, 2020). The International Union for Conservation of Nature (IUCN, 2020) defines conservation as: "*the protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence*".

Biodiversity conservation in South Africa is deeply rooted in the country's turbulent colonial history (Wynberg, 2002). Given this, South Africa has evolved over the years by employing several approaches to address the protection and conservation of biodiversity. By 2002, 6% of land surface and 5% of marine environment were protected as conservation areas (Wynberg, 2002).

According to the NBA (2018), the terrestrial protected area estate has grown constantly over the last 30 years, with more than 8% of the country's land falling within the protected area estate. These protected areas have become more representative of the full range of ecosystem types, increasing the overall level of ecosystem protection. Conservation approaches such as stewardship programmes have been employed in recent years, replacing state purchase as the primary expansion mechanism (SANBI, 2018). Stewardship programmes are conservation approaches aiming to secure land in biodiversity priority areas through partnership with private landowners, Communal Property Associations (CPAs) and the occupiers of communal land, led by conservation authorities and supported by conservation NGOs (SANBI, 2018).

Another approach currently implemented in South Africa to assist with conserving biodiversity is biodiversity offsets. According to a report by IUCN (Independent report on Biodiversity Offsets, 2012), biodiversity offsets are one of several environmental stewardship approaches linked explicitly to the impacts of a development project. These conservation tools aim to compensate for these impacts on biodiversity and ensure that critical biodiversity is not lost (ten Kate *et al.*, 2004; Brownlie & Botha, 2009). The concept of biodiversity offsets as implemented in South Africa is discussed in detail in the section below.

In addition to these approaches, South Africa has a strong legal framework to address biodiversity conservation issues (SANBI, 2018), of which some date back to the post-colonial era (Wynberg, 2002). Some laws relevant to the topic of discussion will be discussed later in this chapter.

### **3.4.1. Biodiversity Offsets in South Africa**

The International Union for Conservation of Nature (IUCN) (2004) defines biodiversity offsets as “*conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure no net loss of biodiversity. Before developers contemplate offsets, they should have first sought to avoid and minimise harm to biodiversity*”.

Biodiversity offsets are adopted to manage the impacts of development activities on biodiversity (Thorn *et al.*, 2018) while providing benefits to a range of stakeholders (Fallding, 2014). Biodiversity offsets are implemented as a last resort once all other appropriate mitigation measures have been exhausted (Brownlie *et al.*, 2017). In South Africa, these mitigation

measures are recommended following an EIA or are included as part of the conditions for granting approvals for development projects (De Witt *et al.*, 2015).

South Africa has a history of striving towards sustainable development and protecting natural resources (Wynberg, 2002). The country has unique biodiversity, which contributes immensely to the livelihoods of communities through ecosystem services and the country's economy (Mnisi, 2020). The impact of human activities on biodiversity globally and in South Africa continues to increase. The implementation of biodiversity offsets globally and recently in South Africa is considered a means of slowing or even reversing the current trends in biodiversity and ecosystem services loss (Lukey *et al.*, 2017). Biodiversity offsets have been implemented in South Africa for almost two decades with the ultimate goal of achieving a no-net loss of biodiversity (Brownlie & Botha, 2009; Brownlie *et al.*, 2017; ten Kate *et al.*, 2004) while achieving a 'net-gain' of biodiversity in practice.

The actual concept of biodiversity offsets originated in the 1970s as part of the Ramsar Convention, with parties to the convention recommending compensation for environmental damage (Hrabanski, 2015). Many countries across the world have since adopted policies to address the concept of biodiversity offsetting, for example, the EU No Net Loss initiative for 2015, which is part of the EU 2020 Biodiversity Strategy (Schulp *et al.*, 2016), China's Law of Environmental Protection (Ali *et al.*, 2018) and The USA Wetland Mitigation program (Gonçalves *et al.*, 2015). The main aim of these policies is to encourage sustainable development in their specific countries and regions.

Several types of biodiversity offsets exist, which are direct and indirect offsets. Direct offsets are defined as; *"those actions that provide a measurable conservation gain for an impacted protected matter (Abdo et al., 2019:67) by creating equal or greater biological diversity than that which was lost, such as creating protected areas, restoring native land cover, and expanding buffer zones (Quintero & Mathur, 2011:1121)".* These include habitat restoration biodiversity offsets (McDonald *et al.*, 2016:1626), biodiversity stewardship programmes (SANBI, 2014; SANBI, 2018; Brownlie *et al.*, 2017) and averted loss biodiversity offsets (Moilanen & Laitila, 2015).

Quintero and Mathur (2011:1122) define indirect offsets *"as mechanisms that include in situ fees paid by the developer on the resources that have been negatively impacted by the development"*. This occurs due to land for offsets not being available at or near the development site, the impact

magnitude of the development on the environment is poorly understood, or inadequate resources being available during project preparations to determine offset criteria.

Currently, South Africa does not have a national policy directly addressing biodiversity offsets, leading to challenges in practice (Brownlie *et al.*, 2017; Lukey *et al.*, 2017; ten Kate *et al.*, 2004). The NEMA and, more specifically, the NEMA section 2 principles and the EIA Regulations give guidance to development projects, especially those with potential adverse impacts on the environment. Only two out of nine provinces in South Africa have drafted and published their provincial guidelines for biodiversity offsets; the Western Cape (DEADP, 2007; later replaced by DEADP, 2011) and KwaZulu-Natal (Ezemvelo KZN Wildlife, 2013). The legislation relevant to biodiversity offsets in South Africa is discussed in the later chapters of this research. The following section highlights the international best practice principles for implementing biodiversity offsets.

### **3.4.2. Principles of Biodiversity Offsets**

Chee (2015) states that for biodiversity offsets to be considered successful, they must at least produce 'no net loss' of biodiversity by achieving adequate conservation results to balance the losses imposed by developmental impacts. BBOP (2013) set the best practice principles for BO, which have been adopted by many countries across the globe, including South Africa. These best practice principles include:

1. **Conservation targets:** offsets must be determined in such a way as to ensure that conservation targets are attainable and not undermined through development and that the size of offset is commensurate with the residual negative impact on biodiversity.
2. **Application of the mitigation hierarchy:** impacts must first be avoided or minimized by using all cost-effective and reasonable prevention, mitigation and restoration/ rehabilitation measures. Offsets are only used to address the residual impacts.
3. **Limits to what can be offset:** offsets are not appropriate to compensate for impacts on irreplaceable biodiversity.
4. **Additional conservation outcomes:** offsets must be 'new' conservation activities, over and above outcomes that would have occurred without the offset; e.g. existing or planned conservation areas cannot be used to offset a new activity. Also, offsets should not comprise actions or activities already required by law.

5. **Enduring conservation outcomes:** offsets must last for the duration of project impacts or in perpetuity. They should be monitored and managed adaptively to sustain desired conservation outcomes.
6. **Science and traditional knowledge:** the design and implementation of offsets should be based on sound science and traditional or local indigenous knowledge.
7. **Enforceable and auditable:** offsets must be able to be legally enforced and audited, through explicitly worded conditions, covenants or contracts.
8. **Landscape context:** offsets should contribute to conservation in a landscape context, supporting an ecosystem approach. Walz (2011) defines landscape context as a pattern of a landscape, which is characterized by its type of use, but also by its structure, for example, the size, shape, arrangement and distribution of individual landscape elements.
9. **Timing:** offsets in the most appropriate form must preferably be secured before development commences.

These principles provide a framework for developing and implementing biodiversity offsets and ensuring success is achieved (ten Kate *et al.*, 2018). In South Africa, these best practice principles complement the NEMA Section 2 principles. Knowing when to offset these best practice principles remains a challenge for success with this conservation tool. The section below addresses this issue.

### **3.4.3. When to Offset?**

An essential aspect of biodiversity offsets is the timing of implementing the offsets and the appropriate steps taken before their design and implementation. A study by BBOP (2012) categorises the following aspects that biodiversity offsets should contain in order to enable its implementation and success: the scope (including the type of compensatory activities), scale (landscape interaction), location, and implementation plan (including monitoring, management and reporting). Even with all these aspects in place, biodiversity offsets should only be implemented as a “last resort” in the mitigation hierarchy (Figure 3.1). They should only be considered once all possible measures and steps have been exhausted to avoid and minimise harm to biodiversity during development projects (ten Kate *et al.*, 2004). The International Union for Conservation of Nature (IUCN) defines the mitigation hierarchy as “a *decision-making framework involving a sequence of steps starting with the avoidance of impacts, followed by the*

*minimization of inevitable impacts, on-site restoration and finally, where feasible and necessary, offset*".

Biodiversity offsets are only applicable to development projects that have fully complied with the mitigation hierarchy principle, an established principle of biodiversity offsets and, as such, is endorsed by environmental laws of many countries, including South Africa. According to Midgely (2015), should the other steps in the mitigation hierarchy (avoid, minimize, restore) not be applied prior to offsetting, then any positive conservation outcomes would not qualify as a 'biodiversity offset'. A brief description of the other steps in the mitigation hierarchy is given below.

### **Avoid**

Avoiding impacts is arguably the most important step of the mitigation hierarchy (Arlidge *et al.*, 2018). This step requires developers to anticipate and prevent adverse biodiversity impacts before commencing with development projects (BBOP 2012). According to Watson *et al.* (2016b) and Lindenmayer *et al.* (2017), the benefits of avoiding impacts towards biodiversity conservation are more than likely to outweigh taking remediation actions, including offsets once the damage has occurred. Adherence to the first step of the mitigation hierarchy is possible by complying with the country's environmental and biodiversity laws, stakeholder engagement, giving clear guidance on critical biodiversity areas, and political buy-in.

### **Minimize**

According to Arlidge *et al.* (2018), this step is central to current conservation activities at the project level, including sustainable use, environmental programs, alternative livelihoods, and payments for ecosystem services. Developers must seek to reduce the 'duration, intensity or extent' of impacts on biodiversity (Midgely, 2015).

### **Restore**

This step of the mitigation hierarchy involves taking remedial actions to restore or re-establish the natural resources that were impacted on or lost during the development projects (Arlidge *et al.*, 2018, De Witt, 2015). This can be in the form of re-introducing species of fauna and flora back to their natural habitats, rehabilitation of natural sites and restoration projects.

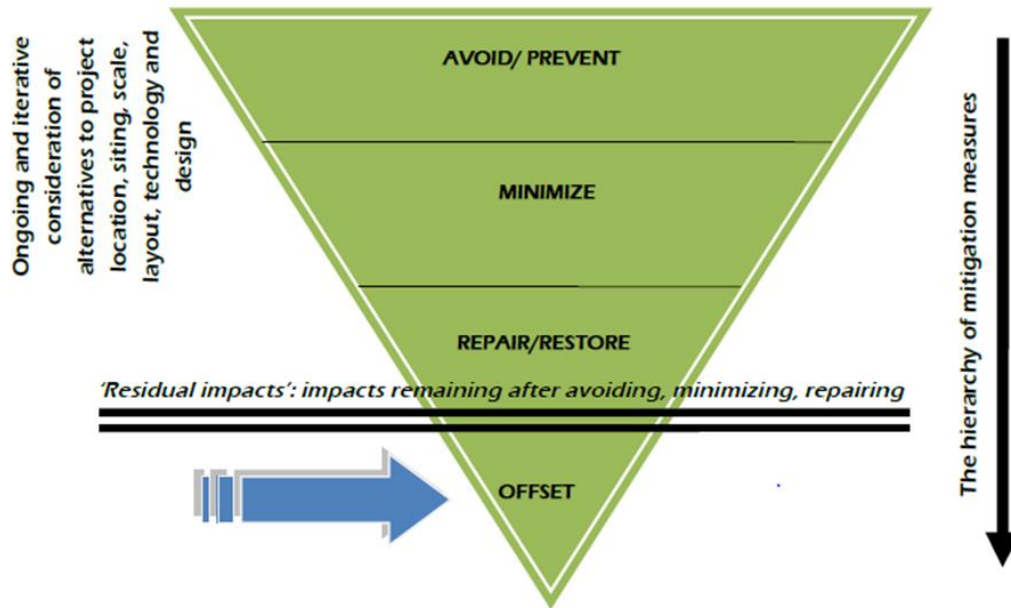


Figure 3. 1: **The mitigation hierarchy (Source: Ezemvelo KZN Wildlife. 2010)**

Developers complying with the mitigation hierarchy must first set biodiversity goals (BBOP, 2012). According to Arlidge *et al.* (2018), these goals usually come in the form of>NNL or Net Gain biodiversity, but also goals such as improving biodiversity trends can be used, for example, the national species recovery plans.

Although biodiversity offsets are recognized internationally as a tool for compensating impacts on biodiversity and the environment as a whole, many authors in this field argue that information on the value of this instrument in conserving biodiversity is scarce (Grimm, 2020); their effectiveness is rarely subject to empirical assessment after implementation (Lindenmayer *et al.*, 2017), absence of reliable information on how offset policies are working in practice (May *et al.*, 2017) and as a result, their contribution to conservation goals and targets are not known. This study aims to contribute to the discussions and arguments surrounding the value of offsets as an instrument for the conservation of biodiversity in South Africa by focussing on experts' knowledge and gathering their views on the perceived benefits of biodiversity offsets for conservation in South Africa. Furthermore, biodiversity offsets can only add value to conservation if their design fits in with the country's national laws where they are being implemented (ten Kate *et al.*, 2018). The following section discusses the legislative framework in South Africa relevant to biodiversity offsets.

### **3.5. BIODIVERSITY OFFSETS: SOUTH AFRICA'S LEGISLATIVE FRAMEWORK**

In South Africa, biodiversity conservation and sustainable development concepts are prioritised and promoted through various legislative provisions (Cilliers *et al.*, 2020). This section discusses the legislative framework giving effect to biodiversity conservation through offsets in South Africa. These laws also support a number of regulatory instruments in South Africa, for example, EIA (Sandham *et al.*, 2013; Mubanga & Kwarteng, 2020; Alberts *et al.*, 2020), with the overall aim of reducing the adverse impacts of humans on the environment. In the absence of a national policy for biodiversity offsets (Jenner & Balmforth, 2015; Brownlie *et al.*, 2017), provision is made within several environmental and biodiversity laws to regulate development projects and their impacts on biodiversity and important natural habitats in South Africa.

#### **3.5.1. The Constitution**

Section 24 of the Constitution states that; *“Everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”*. The Constitution of the Republic of South Africa (Act 108 of 1996) is the cornerstone of all laws within the Republic, giving effect to several environmental and biodiversity laws, more specifically the NEMA.

#### **3.5.2. NEMA and The NEMA Principles**

The NEMA was enacted in 1998 to give effect and cause to the constitutional right of South African citizens to have their environment protected as well as provide co-operative governance and controlling activities that may have a negative and irreversible impact on the environment (Constitution of South Africa, section 24, 1998). The NEMA is the primary law in South Africa dealing with environmental issues. Sustainable development is one of the NEMA's focal points. The NEMA has prescribed principles (NEMA Chapter 1 Section 2) that all organs of state must adhere to, especially when undertaking activities that might significantly affect the environment. These principles guide the interpretation, administration and implementation of the NEMA. One of these principles is the 'polluter-pays' principle which can be implemented through biodiversity

offsets (Louw, 2014). These principles are crucial for effective environmental management, as they assist and support the environmental decision-making process.

Chapter 5 of the NEMA provides Integrated Environmental Management (IEM). The rationale behind this Chapter is to ensure the application of appropriate environmental management tools to promote the integrated environmental management of activities. According to Rantlao (2015), one of the objectives of IEM (NEMA Chapter 5, Section 23) relates to “*assessing the impacts of the proposed activity on the environment and minimising negative impacts while maximising benefits*”; while promoting compliance with the Section 2 Principles of NEMA. Furthermore, the NEMA gives the Minister responsible for environmental matters in South Africa the powers and responsibility to identify the activities that need environmental authorisation prior to commencement. Section 24(5) of the NEMA provides EIA through published and gazetted EIA regulations. These regulations are briefly discussed below. The emphasis will be on the 2014 Regulations (GN R982 in GG 38282 on 04 December 2014).

### **3.5.3. EIA Regulations and Listing Notices**

South Africa was first introduced to the EIA regulations when incorporated in the Environmental Conservation Act (ECA) 73 of 1989 and terms of sections 21 and 26 of this Act in September 1997 (Osborne, 2015). According to Kidd and Retief (2009), the EIA regulations were introduced in 1997 but were only announced in April 2006. Over the years, the EIA regulations in South Africa have transformed, and the process has been strengthened with various changes in its legislative components, making it more appealing and feasible (Montgomery, 2015; Jephthas & Swanepoel, 2019). The current EIA regulations (GN R982 in GG 38282 on 04 December 2014) are enforced under Sections 24(5), 24M and 44 of the NEMA (Act 107 of 1998) (Urquhart & Atkinson, 2000), which superseded the ECA (Hoffman, 2007). According to Rantlao (2015), the purpose of GN R982 is to regulate the procedure and criteria as contemplated in Chapter 5 of the NEMA in relation to the preparation, evaluation, submission, processing and consideration of and decision on an application for authorisation. The aim is to mitigate (avoid, minimize, restore and, where possible, offset) any significant and substantial adverse impacts on the environment and optimise all positive environmental impacts.

Over the past few decades, fundamental perspectives of what EIA is and what it aims to achieve has evolved (Retief *et al.*, 2020). Chapter 5 of the NEMA outlines the implementation of the EIA

process as stipulated in the EIA Regulations and Listing Notices: GN.544 (Listing notice 1, 18 June, 2010), GN.545 (Listing Notice 2, 18 June, 2010), and GN. 546 (Listing Notice 3, 18 June, 2010). Listing Notice 1 (GN R983 in GG 38282 on 04 December 2014) contains a list of the activities that would require a basic assessment; Listing notice 2 (GN R984 in GG 38282 on 04 December 2014) contains a list of activities that require S&EIR while Listing notice 3 (GN R985 in GG 38282 on 04 December 2014) contains a list of “activities that require environmental authorisation when a project is undertaken in specified geographical areas”. These Listing Notices prescribe the level of assessment (basic assessment or full EIA) each project application is subjected to in relation to its level of impact on the environment.

EIA is therefore recognised as a key policy implementation instrument generally understood to assist governments in considering environmental consequences before decisions are made or actions taken (Cilliers *et al.*, 2020:258). According to Afrika (2016), EIA aims to find the ‘best practicable environmental option’ advocated by the IAIA best practice principles, therefore allowing minimal loss of biodiversity in each instance. Biodiversity offsets in EIA are recommended as a last resort by anyone involved in the EIA process (De Witt, 2015), more especially the developer responsible for managing the EIA process to ensure impacts are minimised (BBOP, 2009), and also by the competent authority responsible for approving project proposals (Ezemvelo KZN Wildlife, 2010).

Overall, South Africa has demonstrated a robust legislative framework for biodiversity conservation. This framework has over the years provided a robust platform for the sustainable use and protection of biodiversity in South Africa. The application of the NEMA provides the government with almost unlimited authority to regulate the use and destruction of the natural environment by private interests (Blackmore, 2015). The following section highlights some of the international laws that influence biodiversity conservation in South Africa.

### 3.5.4. International Biodiversity Treaties and Agreements

South Africa's biodiversity laws have their bearing in many international laws and policies. Table 3.1 below summarizes some of these international laws and policies, including treaties and agreements which influence South Africa's biodiversity laws:

Table 3. 1: International Treaties and Agreements

Treaties/Agreements	Aim
1. The Convention for Biological Diversity (CBD)- 1992	Signed by South Africa in 1995 as a globally recognized instrument providing for a comprehensive and holistic approach to the conservation of biodiversity, aiming for the sustainable use of natural resources and the fair and equitable sharing of benefits deriving from the use of genetic resources.  CBD requires the contracting parties or member states to develop their own National Biodiversity Strategies and Action Plans (NBSAP).
2. The Ramsar Convention on Wetlands of International Importance, especially as Waterfowl Habitat (1971)	Signed by South Africa in 1975. The convention ensures commitment by member states to protect the ecological integrity and promote the sustainable use of wetlands. Each member state must designate at least one wetland for inclusion in the Wetlands of International Importance list. South Africa as a country has 17 sites designated to the List of Wetlands of International Importance.
3. Cites Convention on International Trade in Endangered Species of wild fauna and flora (CITES)-1973	Signed by South Africa in 1975 to control international trade in wildlife and wildlife products to prevent over-exploitation and extinction of species. CITES in South Africa is enforced through NEMBA.

<p>4. United Nations Convention to Combat Desertification (UNCCD)- 1994</p>	<p>Signed by South Africa in 1997. The convention aims to develop plans and programmes to stop land degradation by preventing desertification, especially in countries with severe droughts and desertification.</p>
---	--

### 3.6. BIODIVERSITY OFFSET AND CONSERVATION: ARE THERE ACTUAL BENEFITS?

This study investigates the perceived benefits of biodiversity offsets for conservation in South Africa. Discussions around whether or not biodiversity offsets offer benefits for conservation in South Africa continue to exist (Brownlie & Botha, 2009). A question asked in this study is, “are there actual realized benefits for implementing biodiversity offsets for conservation purposes”? The recent successes of biodiversity offsets across the globe are mainly based on its ability to provide economic incentives as compensation for impacts caused by developments (Calvet *et al.*, 2015). In South Africa, the only realized widely discussed benefits of biodiversity offsets towards conservation have been in the form of agreements for acquiring land for conservation purposes and rehabilitating previously degraded habitats (ten Kate *et al.*, 2004; Louw, 2014). According to Maron *et al.* (2016), the more biodiversity offsets become popular with governments and developers across the globe, the more they are used to create and manage protected areas and fund government-run conservation projects.

However, biodiversity offsets are still not yet well understood in South Africa, which creates a gap between what biodiversity offsets can achieve in practice and what they are perceived to achieve. Currently, in South Africa, the actual benefits of biodiversity offsets for biodiversity conservation are still not fully known (Lukey *et al.*, 2017). This is mainly because of the following:

- the ability of biodiversity offsets to accurately determine the full extent of biodiversity loss and then to replace the biodiversity lost is lacking,
- in the absence of a national database and registry for offset projects and practitioners in South Africa; non and inadequate implementation and reporting of offsets projects continue to exist (Brownlie *et al.*, 2019, Lukey *et al.*, 2004; Brownlie & Botha, 2009; ten Kate *et al.*, 2004),
- Reliable information on how offset policies are working in practice is lacking (May *et al.*, 2016:249).

### **3.7. CHAPTER SUMMARY**

This chapter provided a literature review on previous studies pertaining to biodiversity and biodiversity conservation in South Africa. The concept of biodiversity offsets in the South African context and its inclusion in the EIA process was discussed. The chapter also reviewed the legislative framework for biodiversity conservation in South Africa, more specifically NEMA and the EIA regulations. The international laws influencing South Africa's biodiversity conservation were highlighted and briefly discussed. The following chapter presents and provides a thorough discussion on the findings from the study.

## CHAPTER 4

### 4. RESULTS AND DISCUSSION

#### 4.1. Introduction

This chapter presents and discusses the results obtained through the analysis of the questionnaire feedback. This study aimed to investigate the perceived benefits of biodiversity offsets for conservation in South Africa. The questionnaire comprising six questions was designed and used to collect data. The questions were designed in a way that allows the participants to provide their perceptions regarding the concept of biodiversity offsets in South Africa:

1. In your own opinion, what are the potential benefits of biodiversity offsets for conservation?
2. In your own opinion, what are the actual realized benefits of biodiversity offsets for conservation?
3. In your own opinion, what needs to be done to effectively bridge the gap between potential and realized benefits?
4. What is your opinion on the effectiveness of biodiversity offsets projects in South Africa?
5. In your own opinion, what are the challenges affecting the successful implementation of biodiversity offsets projects in South Africa?
6. In your experience, has biodiversity offsets contributed to the conservation effort in South Africa? Please elaborate and provide examples where possible.

Twenty-five respondents, of which fifteen were government officials and ten private environmental consultants, participated in the study. It was important to include both government officials and private environmental consultants in the study because their roles in biodiversity offsets are different to a certain extent. Demographic data of the participants; highlighting the different roles and positions of the participants within their relevant organisations, as well as their level of experience in biodiversity offsets were also gathered and are presented in Table 4.1 below.

Table 4. 1: Demographic information of respondents

Respondent	Sector	Position in Organization	Number of years in the organization	Number of offsets involved in
1.	Private	Environmental consultant/Researcher	30	15
2.	Private	Environmental consultant	12	25+
3.	Government	Environmental Scientist	14	2
4.	Government	Deputy Director: Environment and Biodiversity	7	0
5.	Government	Biodiversity scientist	16	5
6.	Private	Environmental scientist	11	10
7.	Government	Ecologist	13	0
8.	Government	Regional Ecologist	17	5
9.	Private	Environmental Consultant	6	3
10.	Government	Manager Biodiversity Stewardship	3	3
11.	Government	Deputy Director: Biodiversity Planning and Stewardship	20	7
12.	Government	Manager	13	5
13.	Government	Manager Biodiversity economy and stewardship	11	5
14.	Private	Ecologist	25	2
15.	Government	Professional Scientist: Natural Resources	23	4
16.	Private	Lecturer: Department of Nature Conservation	21	0
17.	Private	Environmental consultant	15	5
18.	Private	Environmental consultant	5	1
19.	Government	Nature conservationist	30	±15
20.	Private	Environmental consultant	6	2
21.	Private	Environmental consultant	3	2
22.	Government	Biodiversity scientist	14	3
23.	Government	Area Manager: Biodiversity	15	4
24.	Government	Plant Scientist: Biodiversity	12	3
25.	Government	Head: Biodiversity Management	9	4

The findings of the questionnaire are presented in graphs, listing the main themes, including the frequency or the number of times the respondents mentioned them. After the results of the six questionnaire questions have been presented, a discussion aiming to provide an in-depth interpretation of the results will follow to provide a thorough conclusion to the study. The finding of the questionnaire analysis will now be presented, using the six questions as the main headings.

## 4.2. Potential benefits of biodiversity offsets for conservation

The respondents were asked to give their perceptions on what they consider to be the potential benefits of biodiversity offsets for conservation in South Africa. From their responses, five themes were identified: expansion of protected area estate; long-term biodiversity conservation; ensuring ecosystem services; sustainable development; and providing economic benefits to conservation. The frequency mentions of these themes are illustrated in Figure 4.1 below and will be discussed further.

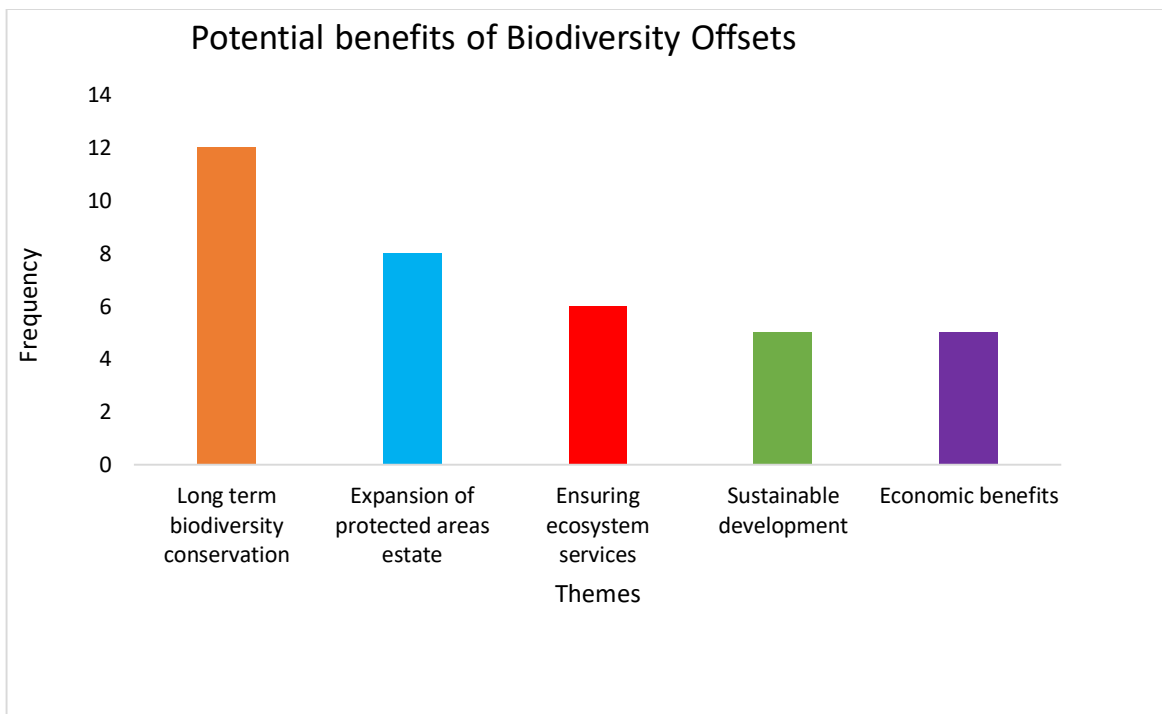


Figure 4. 1: Potential benefits of Biodiversity offsets

### 4.2.1. Long-term Biodiversity Conservation

The theme mentioned most frequently by respondents was ‘long-term biodiversity’ conservation. A total of 12 respondents expressed that biodiversity offsetting can contribute to long term conservation efforts. Reasons offered was that biodiversity offsets “...*have the potential to secure critical priority areas in the landscape [over] the long term and in such way contribute to the conservation of biodiversity and ecological infrastructure for the benefit of all South Africans*” (Respondent 1). A number of respondents highlighted the role that offsetting could play in

specifically protecting areas of high priority or critical biodiversity. This will, however, only be achieved if the offsets are correctly designed and implemented, as argued by Brownlie *et al.* (2017). Nonetheless, it was clear that a commonly held view was that offsetting could assist conservation agencies in protecting high-value biodiversity over prolonged periods through, most likely, formal conservation statuses.

#### **4.2.2. Expansion of protected area estate**

The theme with the second most mentions was '*expansion of protected area estate*'. This theme appeared in 8/25 responses. Both government officials and private consultants highlighted this theme as one of the main potential benefits of biodiversity offsets in South Africa. The respondents point out that biodiversity offsetting as an instrument can help governments globally, including South Africa, achieve their National Protected Area Expansion Strategy (NPAES) targets. Protected areas are defined as geographical spaces, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values (Chape *et al.*, 2003; Githiru *et al.*, 2015). According to a report by Statistics South Africa (StatsSA, 2021), South Africa's protected areas accounted for 11 280 684 ha (or 112 807 km<sup>2</sup>) of the South African mainland during the year 2020. This amount to 9,2% of the size of mainland South Africa. According to StatsSA (2021), for every 100m<sup>2</sup> of land across the country, only about 9m<sup>2</sup> are protected and managed for biodiversity conservation.

Biodiversity offsets as a conservation tool can be a driving tool to assist South Africa in achieving its protected area targets set by the CBD during the 2021 conference. According to Respondent 12 "*Biodiversity offset[s] is one of many tools to contribute towards the country's protected area expansion targets, ...*". With global biodiversity under serious threat of declining, expanding protected areas has been seen as one of the mitigation tools, through offsetting that can reduce this crisis (Coad *et al.*, 2019). Protected areas throughout the globe represent the key cornerstone in protecting and mitigating further habitat degradation and biodiversity loss (Bruner *et al.*, 2001; Coetzee *et al.*, 2014).

### **4.2.3. Ecosystem services**

The third theme identified the contribution that offsetting could make towards ecosystem services. This theme was mentioned in 6/25 of the overall responses as one of the potential benefits of applying biodiversity offsets. According to Egoh (2009), ecosystem services are the benefits that communities obtain from biodiversity. The World Bank (2006) statement indicated that people worldwide are dependent on ecosystem services for their survival. These services include soil formation, the sustainable provision of food, clean air, regulating climate and water supply, and providing the cultural and aesthetic value of certain plants and species (Egoh *et al.*, 2010). According to Ali *et al.* (2018), biodiversity can promote functions that ultimately lead to different ecosystem services. For example, wetlands can assist with water purification and provide habitat for fish for human consumption. Biodiversity and healthy ecosystems are therefore important for communities. In line with these statements, the respondents argued that biodiversity offsets contribute to the sustained provision of ecosystem services by ensuring that the ecosystems are kept “*healthy*” (Respondent 19) and that there is “*compensation for the negative impacts on key ecosystem services*” (Respondent 7). This would be achieved if areas critical to ecosystem service delivery, e.g. mountain catchments, are protected through biodiversity offsets and where impacts on them are unavoidable, similar areas are protected through offsets.

Offsetting may also protect these areas over the long term. Therefore, providing a healthy environment beneficial to current and future generations is a basic human right enshrined in the country's Constitution (RSA, 1996). Biodiversity offsets can assist in achieving this basic human right through the long term conservation of important ecosystems in South Africa.

### **4.2.4. Sustainable development**

The fourth theme identified through the questionnaire was ‘sustainable development’, mentioned in 5/25 responses. The theme highlights the importance of sustainable development through the conservation of biodiversity in South Africa, which can be achieved by implementing biodiversity offsets. South Africa is one of the most biologically diverse countries globally (De Witt *et al.*, 2019). Hence, there is a need to implement policies and conservation tools to protect or compensate for environmental degradation caused by agricultural, industrial and urban development (Ali *et al.*, 2018). The conservation of biodiversity alongside economic development is a key challenge globally, but especially in developing countries (Bull *et al.*, 2013). Having said this, the

respondents argued that biodiversity offsets have the potential to contribute towards the principle of sustainable development, for example, “*to conserve biodiversity for sustainability which should benefit the community*” (Respondent 9), “*promote sustainable development for future generation[s]*” (Respondent 13), and “*promote a more sustainable way of life*” (Respondent 22).

In a developing country like South Africa, the concept of sustainable development is often seen as a hindrance to economic development (Lukey *et al.*, 2017). Biodiversity offsets through proper planning can contribute meaningfully towards sustainable development (Abdo *et al.*, 2019) by offering an approach that connects conservation with industry, potentially providing improved ecological outcomes along with development (Bull *et al.*, 2013). Sustainable development is one of the critical concepts enshrined in the Constitution.

#### **4.2.5. Economic benefits to conservation**

The fifth and final theme dealing with potential benefits of biodiversity offsets that were identified concerned the economic benefits that offsets hold for conservation. This theme was mentioned by five of the 25 respondents and deals with the financial assistance offered by offsetting for biodiversity conservation. For example, “*Leveraging development funds to compensate for negative impacts and funding management of new protected areas*” (Respondent 11) were highlighted as some of the potential benefits that biodiversity offsets can offer for the conservation of biodiversity in South Africa. According to Bull *et al.* (2013) and Lapeyre *et al.* (2015), biodiversity offsets are recognized as market-based instruments to mitigate biodiversity loss globally. As a result, Respondent 21 argued that biodiversity offsets could provide much-needed funding for biodiversity conservation, therefore creating financial security in the long term. According to Respondent 24, “... *Biodiversity offset[s] can assist in unlocking funding for conservation projects, ...*”. These can therefore assist in securing critical biodiversity sites which will ultimately contribute towards achieving the conservation targets. One of the main benefits of biodiversity offsets is to relieve financial pressure from the government or the authorizing department by requiring the developers to fund offset projects (Brownlie *et al.*, 2017). This statement was supported by Respondent 16, who commented: “*biodiversity offsets also offers an opportunity to conserve critical biodiversity assets by buying the land owners option of alternative land use at a market related price without having to purchase the land and management burden*”. Holding developers accountable for their impacts on biodiversity by including biodiversity offsets in their projects authorizations can be one of the ways that this tool can assist in achieving conservation targets

in South Africa and reducing the high rate of biodiversity loss due to development and poor land-use practices.

### **4.3. ACTUAL REALIZED BENEFITS OF BIODIVERSITY OFFSETS FOR CONSERVATION**

In addition to the potential benefits that biodiversity offsets offer conservation, respondents were asked to reflect on the benefits that, in their experience, have already been realized through offsets. The results are presented in Figure 4.2. As most participants have been involved in several offsetting projects, several realized benefits could be identified. Only one of the 25 respondents indicated that he/she was not aware of any realized benefits. This could, most likely, be ascribed to the respondent's limited exposure to offset projects. Three key themes were identified from the responses: expansion of the protected area estate, preservation of species and habitats, and finally, economic benefits. The three themes will now be discussed in detail.

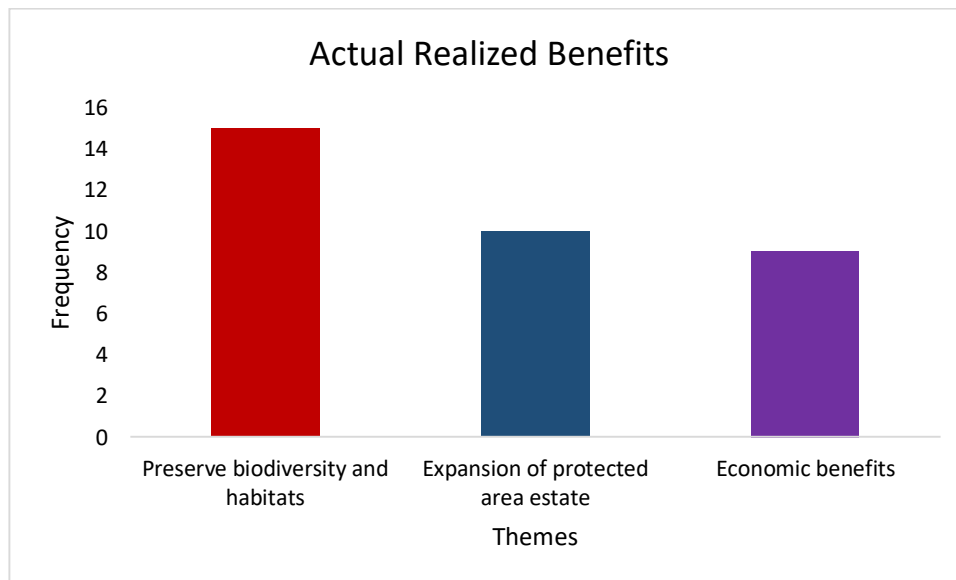


Figure 4. 2: Realized benefits of biodiversity offsets

#### **4.3.1. Preserve biodiversity and habitats**

The first theme discussed in this section is ‘preserving biodiversity and habitats’. This theme featured in 14/25 responses and was highlighted as one of the main benefits realized through biodiversity offsets. Although there is certainly an overlap between this benefit and the expansion of the protected area network, offsetting that can contribute to the protection of under-protected biodiversity or biodiversity of high value should be highlighted. Because of this, the respondents argued that “...*biodiversity offsets have been used to strategically target areas and features that are in desperate need of protection, ...*” (Respondent 13), “...*preserving the species, ...*” (Respondent 3) and “...*preserving biodiversity and securing important habitats in order to reduce the risks of biodiversity loss which is one of the challenging topics globally, ...*” (Respondent 17). Biodiversity offsets have been increasingly used in a wide range of sectors as a mechanism to help compensate for the adverse impacts caused by development projects in a variety of ecosystems (OECD, 2016). Based on the ‘polluter pays’ approach (OECD, 2016), biodiversity offsets are generally implemented within an overall objective of ‘no net loss’ of biodiversity (Brownlie *et al.*, 2017). However, many authors argue that this objective is unlikely to be realistic in a developing country like South Africa (Brownlie & Botha, 2009). According to Buschke *et al.* (2019), biodiversity offsets in South Africa do not aim for a ‘no net loss’ of biodiversity but discourage development in ecosystems that may be approaching thresholds of sustainable transformation. This is mainly due to the conservation concern and risks involved being too high for these ecosystems (Pilgrim *et al.*, 2013).

#### **4.3.2. Expansion of protected area estate**

In addition to preserving species and habitats, the expansion of the protected area estate was highlighted as one of the benefits realized through biodiversity offsets. This theme is mentioned frequently by the respondents. The expansion of the protected area estate was also highlighted as the central theme discussed in the previous section dealing with the potential benefits of biodiversity offsets for the conservation of biodiversity in South Africa. Biodiversity offsets have been presented as a tool for achieving protected area targets both globally (May *et al.*, 2016; Pilgrim & Bennun, 2014; Githiru *et al.*, 2015; Maron *et al.*, 2016) and in South Africa (ten Kate *et al.*, 2004; Buschke *et al.*, 2019). According to ten Kate *et al.* (2004) and Louw (2014), the NPAES outlines the goals and targets for expanding protected areas in South Africa. Respondents argued that several benefits had been realized through biodiversity offsets in South Africa. According to

Respondent 2, “...more than 50 000 ha have been secured in the Northern Cape as protected areas through biodiversity offsets, ...”. Protected areas are crucial for conserving biodiversity (Buschke *et al.*, 2019). According to Buschke *et al.* (2019), the expansion of the protected area estate is reflected in Aichi Target 11 of the CBD, which aims to protect at least 17% of terrestrial and 10% of marine areas by 2020. However, many developing countries lack the resources to achieve Aichi Target 11 of the CBD (Buschke *et al.*, 2019; Bruner *et al.*, 2004; Githiru *et al.*, 2015). Economic benefits through biodiversity offsets are discussed below as an alternative resource for developing countries to achieve Aichi Target 11 of the CBD.

### **4.3.3. Economic benefits**

The third and final theme under the realized benefits of biodiversity offsets is ‘economic benefits’. Six of the 25 respondents mentioned this theme and highlighted the economic benefits biodiversity offsets provided for biodiversity conservation in South Africa. Economic benefits of biodiversity offsets for conservation were also discussed in the previous section addressing the potential benefits of biodiversity offsets. In South Africa and many parts of the world, economic benefits of biodiversity offsets have been realized through mainly securing critical biodiversity sites (May *et al.*, 2016) and funding the management of already existing protected areas (Githiru *et al.*, 2015). This was evident in the responses of several respondents. Respondent 10 (government official) highlighted a case whereby financial benefits were realized as a result of biodiversity offsets: “*In the Northern cape we have a number of offsets agreements with developers and are currently implementing them. The developer is usually liable to financially support their offsets, so the management authority (usually the department) doesn't have the financial burden to effectively manage the offsets, this usually benefits the department as there is a financial gain*”. This was supported by Respondent 2 who also referred to a case in Northern Cape by commenting: “*...we have >50 000ha secured as PAs at no cost to the state, at least R10m in actualized management costs for these areas are spent p.a. (per annum), ...*”.

Biodiversity offsets in South Africa have been designed specifically to compensate for the residual loss of biodiversity caused by development; by establishing and managing critical biodiversity areas within the same ecosystem type (Buschke *et al.*, 2019). According to Bishop *et al.* (2006) and the CBD (2014), the effective conservation of biodiversity through securing and managing critical biodiversity areas is costly, and current provisions of funding this exercise globally are insufficient, especially in developing countries. The funding generated through offsets projects

plays a vital role towards conservation projects (Brownlie *et al.*, 2017), especially securing areas with critical biodiversity (ten Kate *et al.*, 2004) and assisting the country in expanding the protected area estate (Brownlie & Botha, 2009). According to Githiru *et al.* (2015), using offsets as a financing mechanism for improved management of critical biodiversity areas and other related conservation projects is feasible and additional. It plays a crucial role in securing sites already recognized as vital for biodiversity conservation globally. However, Githiru *et al.* (2015) and Buschke *et al.* (2019) stressed that generating funds through offsets should not be seen as a means by government departments to reduce or not make provisions to fund existing and future conservation projects, especially the protected areas.

#### **4.4. BRIDGING THE GAP BETWEEN POTENTIAL AND REALIZED BENEFITS**

In addition to the respondents reflecting on what they consider to be the potential benefits of biodiversity offsets and those benefits that have been realized, the respondents were asked to reflect on what they perceive to be the missing link in order to bridge the gap between the potential and the actual realized benefits of offsets for conservation purposes. Some realized benefits are not observed in every case, and some of the potential benefits are not perceived as realized. Reflecting on ways in which benefits can be realized is important to ensure that we can move to words more effective offsetting in future.

All the respondents provided insights, and the analysis of their responses produced six themes: National Offset Policy, Government support, Capacity, Public involvement in offsets, National offset register, and conservation banking. These themes are illustrated in Figure 4.3 and will be discussed below.

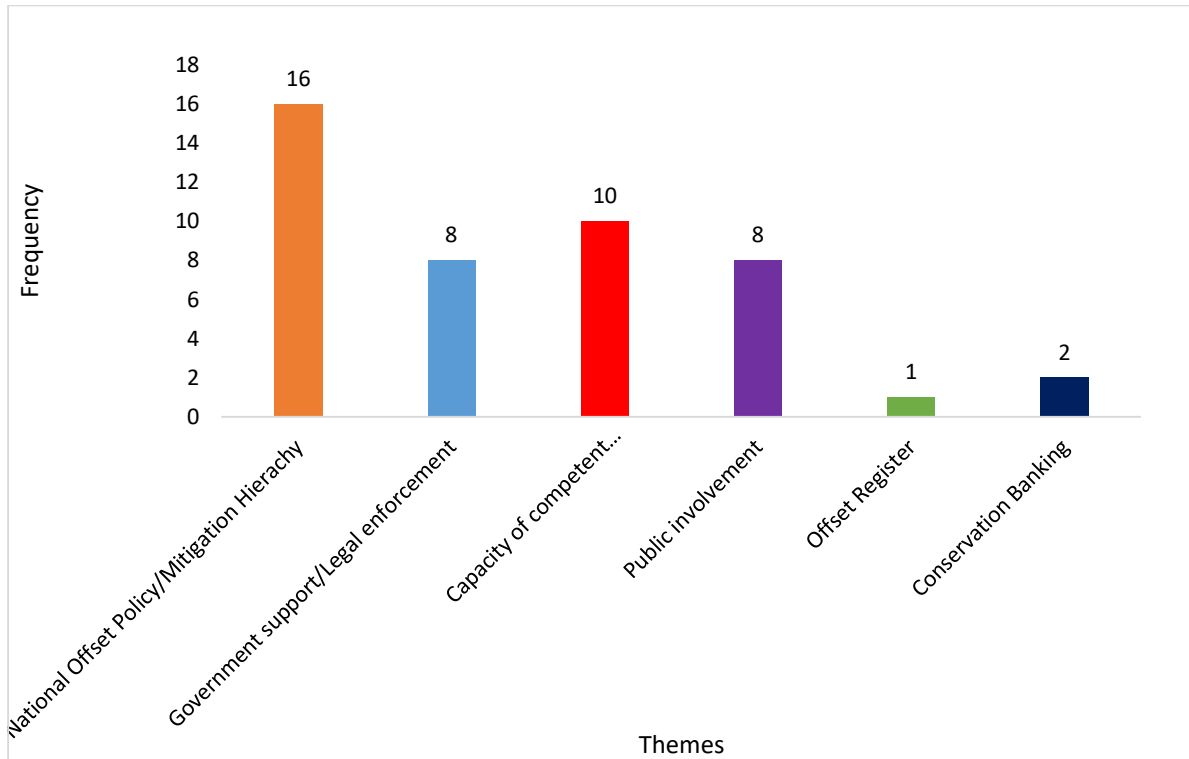


Figure 4. 3 Bridging the gap between potential and realized benefits of biodiversity offsets

#### 4.4.1. National Offset Policy

The theme ‘National offset policy’ was the first theme identified by analysing the responses to the third question. This theme was mentioned by most of the respondents (16/25). The respondents, both government officials and private consultants alike, strongly highlighted the need for a national policy for offsets in South Africa to guide the design and implementation of biodiversity offsets. Currently, there is no national legislation or policy explicitly giving effect to biodiversity offsetting in South Africa (Jenner & Balmforth, 2015). The absence of this guiding policy has been highlighted as one of the primary stumbling blocks in realizing the success of biodiversity offsets as a conservation tool in South Africa (Brownlie *et al.*, 2017; Brownlie & Botha, 2009; Lukey *et al.*, 2004; Lukey *et al.*, 2017; ten Kate *et al.*, 2004; De Witt *et al.*, 2019). The respondents also highlighted this, for example, “Many authorities are reluctant to include offsets in conditions due to the policy vacuum on offsets, believing that decisions would be vulnerable to challenge (which is the case!)” (Respondent 1); “National Offsets policy needs to be approved to give proper guidance on the implementation of offsets” (Respondent 10); “National policy and best practice guidelines are required to achieve this. Provincial guidelines will also contribute” (Respondent

11). Although provision is made through NEMA to avoid, minimize and remedy impact on the environment and biodiversity specifically (Jenner & Balmforth, 2015), a national policy for biodiversity offsets remains a crucial component in the success of this conservation tool.

#### **4.4.2. Government support and legal enforcement**

In addition to the respondents strongly recommending adopting a national policy for offsets, the role of government and the increased support from decision-makers were highlighted as vital to the success of biodiversity offsets in South Africa. The role of governments is to draft and enact policies into laws and ensure the enforcement of these laws, including setting aside land for conservation purposes. Therefore, the success of many environmental and biodiversity policies relies on the government's involvement through the relevant government departments tasked with implementing and enforcing these laws and policies. According to Respondent 13, "*The relevant government department must ensure that the developer is held responsible and must be accountable for seeing it through and resources the management of offsets. The Environmental Authorization must include a strong clause on the recourse in the event of mismanagement or negligence. A thorough audit process needs to be done regularly to assess the management effectiveness of the offsets*". Although the different government departments are tasked with authorizing applications for development projects (Brownlie *et al.*, 2017), the interpretation and understanding of biodiversity offsets has proven to be a stumbling block in most instances. The absence of a guiding policy contributes to this misinterpretation of what biodiversity offsets can and cannot achieve in practice, affecting how the relevant government departments manage them. According to Jenner and Balmforth (2015), the continued absence of an explicit national offset policy and a set of standard rules may result in inconsistent approaches to offsetting, many in-complete offset projects and failure of this conservation tool.

#### **4.4.3. Capacity of competent authorities and consultants**

The third theme that emerged from the analysis of the responses dealt with the capacity of competent authorities and consultants. The respondents highlighted the issue around the capacity of competent authorities and consultants as one of the contributing factors affecting biodiversity offsets in practice. Respondent 1 commented: "*There is a huge difference in the capacity of the environmental competent authorities between provinces, ...*". This was further highlighted by Respondent 22, who commented: "*There are some shortcomings in the process, particularly the*

*quality of some specialists reports that misrepresents the biodiversity that is proposed to be lost or offset to the competent authority. Some specialists are even forced to sign non-disclosure agreements to avoid information becoming available that the developer had not intended on sharing, which is very dubious, ...”.*

The lack of capacity at the governance level, both local and national government departments and private environmental consultants is a recurring concern. It remains an issue that should be thoroughly investigated and remedied to ensure that biodiversity offsets are implemented timely and practically to achieve the intended outcomes. According to Brownlie *et al.* (2017), the levels of insight towards applying the mitigation hierarchy, including biodiversity offsets, require instant improvement in the government and private sectors. More conservation consultants are needed to assist developers in offsets (Respondent 10) and capacity building needs to be targeted, coordinated and supported by the government (Brownlie *et al.*, 2017:253). Respondent 2 and Respondent 11 recommended that the following needs be prioritized to address the lack of capacity of competent authorities and consultants:

- *“Improved training and capacitation of EAPs and specialists to effectively design and prepare offsets for implementation is needed”;*
- *“EAPs and specialists need to be trained in using critical biodiversity areas and Protected areas expansion maps in order to trigger, calculate, and locate offset areas”;*
- *“Capacity-building on biodiversity offsets within government (competent and commenting authorities), as well as the business sector/developers and EAPs”;*
- *“Building of skills base on existing and emerging biodiversity offset specialists”.*

It is evident that the lack of capacity and resources, especially at the governance level, hampers the quality of biodiversity offsets in practice.

#### **4.4.4. Stakeholder involvement**

The fourth theme deals with stakeholder involvement in offsets. Eight out of 25 respondents mentioned *“stakeholder involvement”* in their responses as a means of bridging the gap between what biodiversity offsets can do and what it achieves in practice. Principle 6 of the biodiversity offset best practice guidelines reads, *“In areas affected by the project and by the biodiversity offset, the effective participation of stakeholders should be ensured in decision-making about biodiversity offsets, including their evaluation, selection, design, and implementation and*

*monitoring*” (ten Kate *et al.*, 2018). According to Jenner and Balmforth (2015), effective participation, transparency and good communication among everyone involved in an offset project are vital for the success and fairness of offsets. Stakeholders, more especially the public affected by proposed developments, could play an important supporting role in scrutinizing development projects, pointing out matters that the government may have missed, and raising controversial issues that a government official may not be comfortable doing (Gibson, 2013; De Witt *et al.*, 2019). Provision for stakeholder or public involvement is made in the environmental legislation in South Africa for any development affecting the environment and livelihoods of communities. The following responses stressed the need for public involvement in biodiversity offsets projects: *“implement policies which would encourage community participation and management at a landscape level (Respondent 8)”, “educate the public in matters of conservation” (Respondent 12), “obtain buy in from landowners in rural areas” (Respondent 18), “Working with NGO’s can help bridge some of the gaps, particularly where an on-site offset is not possible and a financial offset must be considered. The NGO’s could pool these resources in order to secure and bank large, priority conservation properties in partnership with the local conservation authorities. These key acquisitions can often exceed the size of the offset requirement as buying larger properties become a lot cheaper per hectare to secure” (Respondent 21).* Jenner and Balmforth (2015) state that engaging key stakeholders are critical in informing and influencing the design and location of offsets. It has been noted that most of the land with high biodiversity value is under the custodianship of communities and private landowners, and as a result, their involvement in offsets can influence the selection of land with high biodiversity value for offset projects. According to the BBOP (2009), *“The long-term success of any biodiversity offset initiative (Principle 8) will require an adaptive management approach that is owned by all those involved in offset implementation, including communities. A well planned biodiversity offset will involve affected indigenous people and local communities in monitoring and evaluation of the offset”.*

#### **4.4.5. Biodiversity Offset register**

The need for a biodiversity offset register emerged as the fifth theme contributing to the discussion on bridging the gap between potential and realized benefits of biodiversity offsets. Although only one respondent mentioned the need for a well-maintained biodiversity offset register, it has also been mentioned in the literature (Brownlie & Botha, 2009; Brownlie *et al.*, 2017, Lukey *et al.*, 2017, De Witt *et al.*, 2019, ten Kate *et al.*, 2004). A biodiversity offset register has been indicated as a valuable means of ensuring transparency and accountability. South Africa currently does not have

a register dedicated to recording information on previous, current and proposed biodiversity offsets projects (Brownlie & Botha, 2009; ten Kate *et al.*, 2004; De Witt *et al.*, 2019). As a result, relevant information containing the type of offsets proposed, the impact being mitigated, whether successful or not in achieving the intended outcomes, is therefore lost. Without this basic information, there is no way of measuring the efficacy of offsetting, nor is there any way of knowing whether offsetting is making the positive impacts envisaged by the National Development Plan 2030 (Lukey *et al.*, 2017).

#### **4.4.6. Conservation banking**

The final theme that emerged in this section deals with conservation banking. Conservation banking is a market-based instrument applied globally to promote biodiversity conservation (White *et al.*, 2021). White *et al.* (2021) highlights the difference between biodiversity offsets and conservation banking by stating that in conservation banking, the focus is entirely on protecting and conserving habitats and species that are considered endangered by law and not on achieving a no-net-loss or net gain, which is part of the mitigation hierarchy. Therefore, these mechanisms deliver conservation outcomes through activities that protect, restore, and enhance biodiversity (von Hase, 2013). The respondents addressed the issue of conserving biodiversity through the use of conservation banking mechanisms by commenting; *“A move towards conservation banking rather than project-by-project offsets is required in order to bridge the gap between potential and realized benefits for conservation”* (Respondent 6), and *“Consideration towards the feasibility of developing a biodiversity offset banking system in SA for a more coordinated, strategic approach to establishing and managing biodiversity offsets for all environmental assessments (EAs)”* (Respondent 11). According to Brownlie *et al.* (2017), a ‘project by project’ approach to biodiversity offsetting has been placing strain on competent authorities and conservation agencies, and as a result, a more strategic approach in the form of conservation banking is deemed necessary especially given that South Africa’s conservation priority areas are known. However, this approach faces challenges in South Africa in the absence of a national policy on offsets. The following are some conservation banking mechanisms as practised in other countries across the globe:

Table 4. 2: **Conservation Banking mechanisms in other countries**

<b>Country</b>	<b>Type of Conservation banking mechanisms</b>	<b>Purpose</b>
USA	1. Wetland Mitigation Banking	To address residual impacts on water resources and wetlands under Section 404 of the Clean Water Act (CWA) of 1977.
	2. Conservation banking	To address impacts on species listed as threatened or endangered under the Endangered Species Act (ESA) of 1973.
Germany	Federal Nature Conservation Act of 1976 (revised in 2002 and 2010) and Article 19 on the Impact Mitigation Regulation	To ensure “no net loss” through strict application of the mitigation hierarchy.
Australia	1. Bushbroker (administered by the Department of Sustainability & the Environment (DSE) in the State of Victoria)	To facilitate the exchange (buying or selling) of native vegetation credits, which may be required to offset the clearing of native vegetation through an equivalent gain.
	2. Biobanking	To create opportunities for landowners through voluntary agreements to generate income by managing their land for conservation and help developers obtain credits that offset residual negative impacts of their projects on biodiversity.

#### **4.5. ARE BIODIVERSITY OFFSETS EFFECTIVE IN SOUTH AFRICA?**

In addition to their view and experience about the benefits of offsets for conservation, participants were asked to reflect on the overall effectiveness of biodiversity offset projects in South Africa based on their experience. Responses were grouped into those that perceived offsetting as effective and those that did not, or otherwise poor. Respondents were fairly equally split, as illustrated in Figure 4.4 The findings will now be discussed.

#### **4.5.1. Effective offset projects**

As illustrated in Figure 4.4 below, 12/25 respondents (4 private environmental consultants and 8 government officials) agree that biodiversity offsets are effective. The respondents reflected on the effectiveness of biodiversity offsets through their experiences in its implementation. According to Respondent 21 (private environmental consultant), *“biodiversity offsets are very effective, most projects have good results, we just don't hear about it”*, while Respondent 9, also a private environmental consultant, commented: *“Offsets have had a mixed history of effectiveness but if implemented appropriately can play a strong role in securing critical biodiversity and leveraging effective conservation finance”*. The majority of government officials associated the effectiveness of biodiversity offsets with the expansion of the protected area estate, for example, *“It's quite a mixed bag of successes and failures, but as it's a relatively new space, the quality of the outcomes seems to be improving while also creating new opportunities for large-scale Protected Area expansion initiatives”* (Respondent 22), *“biodiversity offsets contribute hugely to the Protected Area Estate and thus allowing us to reach our conservation targets both at the provincial and national level”* (Respondent 10). According to ten Kate *et al.* (2004) and Louw (2014), expanding the protected area estate is one of the most successful stories of biodiversity offsets in South Africa. In addition to respondents seeing biodiversity offsets as effective, many of the respondents consider biodiversity offsets as being poor in delivering conservation goals.

#### **4.5.2. Poor offset projects**

Several respondents (13/25), most of which are private environmental consultants, consider biodiversity offsets in South Africa as poor in their application and processes. The following responses highlight factors that the respondents pointed out as contributing to biodiversity offsets being considered poor in South Africa; *“The majority of biodiversity offset EA condition requirements are poorly implemented due to various reasons. The reasons vary from poorly written conditions to lack of understanding on the part of the developer (EA holder) on their responsibilities towards establishing the required biodiversity offset”* (Respondent 11), *“They are partially effective due to too much legislation. The approach is not integrated.”* (Respondent 8), *“Currently not effective, the guiding policy and implementation not enforced and not gazette like other legislations. It has to have a legal basis”* (Respondent 3). The majority of the respondents highlight the lack of clear policy guidelines and enforcements as major contributors to offsets in South Africa being poor in their application and processes. This was highlighted by Brownlie *et*

al. (2017:252) who stated, “Biodiversity offsets in South Africa are unlikely to succeed without an explicit regulatory driver, embedded in a sound enabling framework”. Respondent 24 also commented: “Biodiversity offsets can only be as effective to the degree of being monitored for compliance”. Precise and reliable information on residual negative impacts should be made available from, for example, the EIA prior to decision-making to allow the inclusion of clearly defined offset conditions in the authorisation including elements of offset design and implementation (Brownlie *et al.*, 2017).

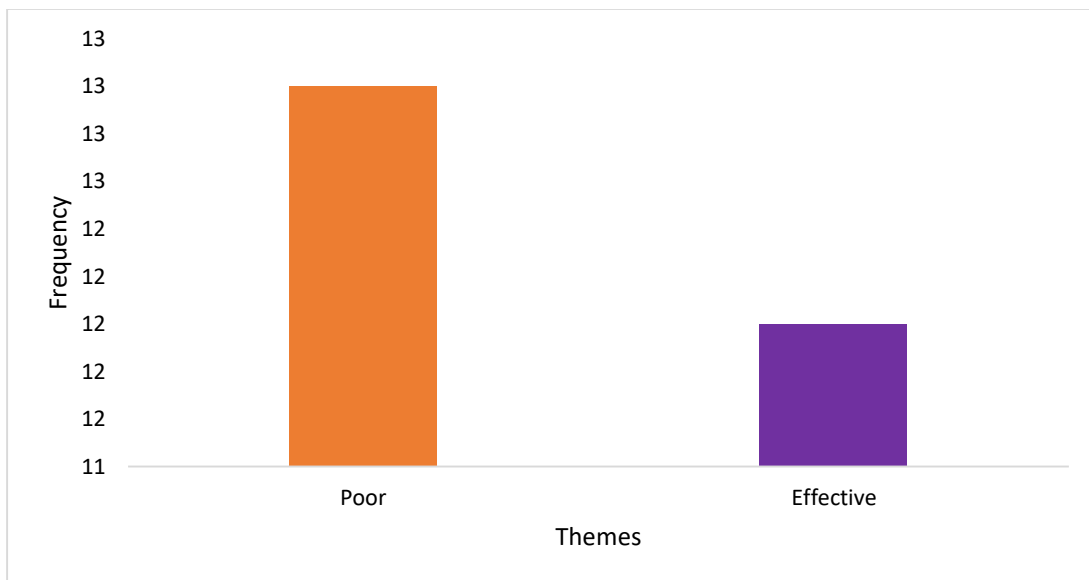


Figure 4. 4: Effectiveness of biodiversity offsets

#### 4.6. CHALLENGES AFFECTING BIODIVERSITY OFFSETS IN SOUTH AFRICA

In addition to discussing the benefits and effectiveness of biodiversity offsets in South Africa, respondents were asked to reflect on the challenges they have encountered with them. Although this study focused on biodiversity offsets in the South African context, challenges affecting the implementation of biodiversity offsets (Figure 4.5) have been documented globally (ten Kate & Crowe, 2014; Brown *et al.*, 2014; Gonçalves *et al.*, 2015; McKenney & Kiesecker, 2010) and in South Africa (Brownlie & Botha, 2009; Brownlie *et al.*, 2017; De Witt, 2015; Jenner & Balmforth, 2015). The respondents were asked the question, “In your own opinion, what are the challenges affecting the successful implementation of biodiversity offsets projects in South Africa”? This

question aimed to tap into the respondents' experiences and allow them to share their experiences on the challenges regarding the implementation of biodiversity offsets in South Africa. The respondents mentioned the following challenges: legal barriers (policy and guidelines), Capacity (including monitoring and enforcement) of competent authorities and consultants, lack of funding and finally, the selection of suitable locations for offset projects. This section discusses these challenges, as illustrated in Figure 4.5 below.

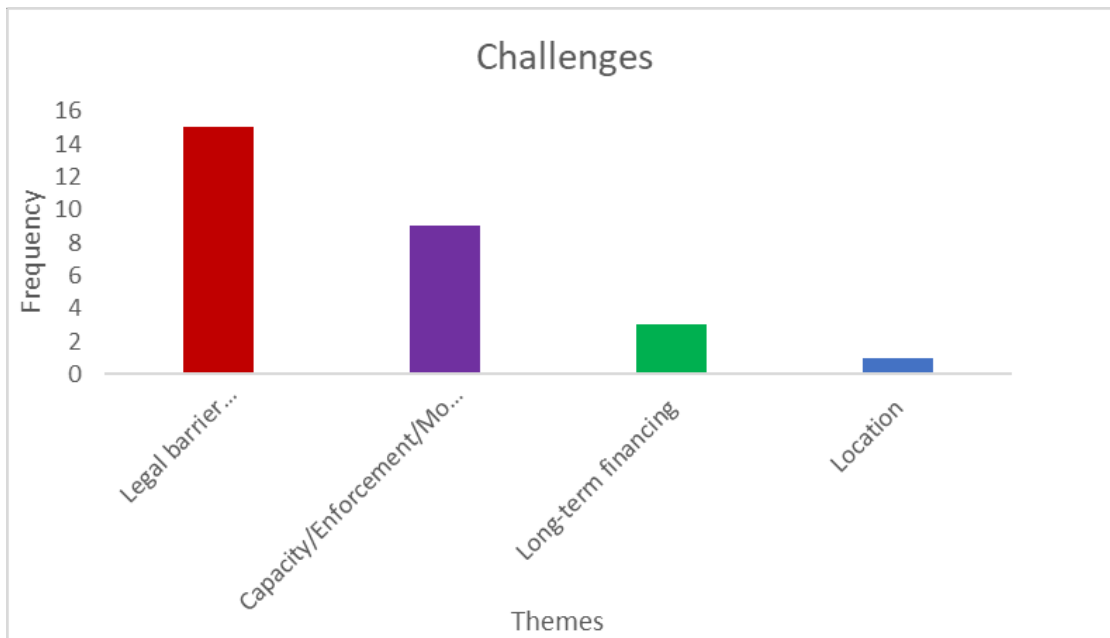


Figure 4. 5: Challenges affecting BO in South Africa

#### 4.6.1. Legal barrier (National Policy & Guidelines)

The first challenge encountered with implementing biodiversity offsets in South Africa is the absence of a clear legal framework for regulating offsets. The legislative framework supporting biodiversity offsets was also highlighted in the previous section as one way to bridge the gap between what offsets can do and what they can achieve in practice. The absence of a guiding policy for biodiversity offsets in South Africa continues to be a much-discussed challenge affecting offsets projects. The respondent highlighted this in their responses to the question, “In your own opinion, what are the challenges affecting the successful implementation of biodiversity offsets projects in South Africa”? The national policy with clearly set out principles, defensible methodologies, and realistic standards (ten Kate & Crowe, 2014) can bridge the gap between potential and realized benefits that biodiversity offsets can provide for conservation in South

Africa. According to Brownlie *et al.* (2017), biodiversity offsets are unlikely to achieve the intended results without an explicit legal framework. The policy is supposed to guide the design and implementation of biodiversity offsets throughout all the provinces in South Africa. “*Lack of guidelines, firm policy framework, targets, vague and inconsistent application of existing legislation*” (Respondent 14; Respondent 3), “*inadequate implementation of the mitigation hierarchy, inconsistent wording of environmental authorisations*” (Respondent 9) are some of the challenges caused by the lack of a clear national policy on offsets. According to Respondent 10, “*with the National offsets policy still not approved yet, conservation authorities are using their discretion to implement offsets*”. The statement above was supported by Respondent 11 who commented: “*...firstly what is required is the development and implementation of national policy and best practice guidance is required to create an enabling environment for a consistent approach to the establishment and management of biodiversity offsets linked to EAs*”.

Based on the responses from the respondents, it is clear that there is a call for urgent adoption of a national policy on offsets in South Africa to realize the benefits associated with this conservation tool.

#### **4.6.2. Capacity, monitoring and enforcement**

Lack of capacity, monitoring and enforcement was the second major challenge to implementing biodiversity offsets in South Africa. This challenge was also discussed in the previous section addressing the need to bridge the gap between the potential and actual realized benefits of biodiversity offsets in South Africa. According to Respondent 1, “*lack of capacity is probably the biggest challenge - to the design and implementation of offsets. Currently there is a handful of specialists who can take on biodiversity offset projects, and there is a huge lack of capacity building to address this shortage, ...*”. According to De Witt (2015), poor understanding of offsets at the governance level is a challenge, which leads to frustrations among developers due to poor clarity from competent authorities and specialists regarding offsets. Capacity constraints, including the required capacity building and training on offsets at the governance level, is also lacking (Brownlie *et al.*, 2017). This, in turn, also affects the monitoring of offsets projects and enforcement of authorization conditions. Strict, auditable and enforceable conditions of authorisation are vital where offsets are concerned (Brown *et al.*, 2014; Brownlie *et al.*, 2017), and the lack of, will result in this tool not being effective after implementation.

### **4.6.3. Financing**

The respondents' third major challenge involves funding offsets projects in South Africa. According to the respondents, “*securing long-term financing of offset projects is lacking*” (Respondent 6) and “*there are limited financial arrangements to hold offset guarantees or annual management funds*” (Respondent 2). Without proper funding, biodiversity offsets are subjected to failure. According to Brownlie *et al.* (2017), the current funding of offsets in South Africa is in the form of trust funds which are being used to finance offsets, especially in the Northern and Western Cape Provinces of South Africa. Western Cape is one of the provinces in South Africa with active Provincial Guidelines for biodiversity offsets, while Northern Cape is leading in biodiversity stewardship programmes. Developers intending to offset are expected to avail sufficient funds that should last for at least the duration of the offset project (BBOP, 2012). Currently, in South Africa, the legislation does not specify the duration of the offset (Brownlie *et al.*, 2017), and as a result, the developers are not being held accountable and offset projects fail due to lack of long-term financing.

### **4.6.4. Location**

The fourth challenge that the respondents highlighted relates to finding a suitable location for an offset project. According to the respondents, securing land of similar biodiversity value for offset projects is becoming one of the challenges affecting biodiversity offsets. Respondent 10 highlighted this challenge by commenting: “*it is not always a given that developers will be able to find/locate sites that match the exact biodiversity that was lost. In the Northern Cape, there is a rise in developments with limited landscape with the same biodiversity features to work with*”. According to Gonçalves *et al.* (2015), selection of sites for offsets projects and their location within the broader landscape is another crucial aspect of offset design. The ideal situation is to select a site close to the development area (McKenney & Kiesecker, 2010). The idea behind delivering offsets at close proximity to the lost habitat or development area is that it increases the chances of contributing to the conservation and integrity of the same ecosystem and the needs of local people (Gonçalves *et al.*, 2015).

On the other hand, sites identified as the first choice from a biodiversity perspective are sometimes on land where the government anticipates significant development potential in the

future, for example, mining or housing developments (Jenner & Balmforth, 2015). Jenner and Balmforth (2015:4) further stated, “*conflicting agendas relating to the use of land and natural resources are creating conflicts between sectors with unaligned priorities, while power imbalances between ministries mean that biodiversity and ecosystems are often overlooked and unaccounted for in development planning and decision making*”. The effective functioning of biodiversity offsets also depends on the political buy-in of law and decision-makers, and this has proven to be a difficult task, resulting in difficulties in securing sites for biodiversity offsets.

#### **4.7. CONTRIBUTION OF BIODIVERSITY OFFSETS FOR CONSERVATION EFFORTS IN SOUTH AFRICA**

Respondents were finally asked to reflect on the extent to which offsets have been contributing to conservation efforts in general. They were further asked to provide examples of projects that contributed. The results are structured around responses that felt a significant contribution than those that did not. Overall, most respondents (19/25) felt that offsets did contribute (Figure 4.6), while only six felt otherwise. Of the 19 respondents, 9 represented various relevant government departments, while the remaining 10 represented the private sector. The respondents were asked to elaborate further by providing examples of projects that contributed significantly to conservation efforts through offsetting.

The majority of the respondents highlighted some of the positive contributions that this tool provides for conservation in South Africa. According to Buschke *et al.* (2017), biodiversity offsetting has been presented as a tool for meeting conservation targets, especially the protected area targets in line with the Aichi Biodiversity Target 11 under the CBD. Several respondents emphasized this, for example:

*“Namaqua National Park and Goegap nature reserve are both expanded by >5000ha as a result of offsets. New protected areas have been created in Mpumalanga (De Berg Nature reserve & Buttonshope - 5 -10 000 ha) with a large management fund,”* (Respondent 2);

*“one good example in the Ingula Nature Reserve biodiversity offset. The Ingula NR was declared in terms of NEMPAA due to the wetland being in a pristine condition which needed to be protected to mitigate the associated impacts from the pumped storage*

scheme. The offset demonstrates good collaboration between public and private partners, which has contributed to its success” (Respondent 7);

“Both the Clairwood Race Track Development and the Spring Grove Dam offsets have shown the potential of offsets to play an important role in securing critical remnant biodiversity. Although neither were perfectly implemented both have resulted in the declaration of two new nature reserves and have provided funding to ensure the nature reserves are effectively managed” (Respondents 9).

From the respondents' comments, it is clear that biodiversity offsets play a positive role in conserving biodiversity in South Africa through the expansion of protected area estate. Currently, there is no offset register in South Africa to record the contribution of offsets projects, and this warrants further investigations.

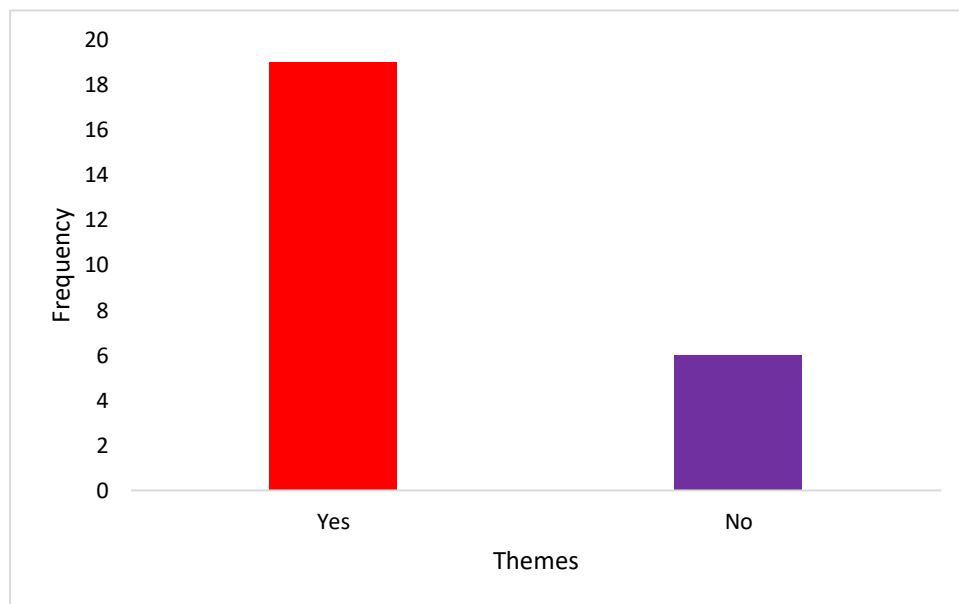


Figure 4. 6: Contribution of biodiversity offsets for conservation efforts in South Africa

#### 4.8. DISCUSSION

In this section, the key findings of the analysis are discussed in reference to the questions in the questionnaire. The questionnaire was designed to draw from the perceptions of experts in the field of biodiversity offsets, both from the relevant government departments and the private

environmental consultants. This was done to better understand biodiversity offsets through their perceptions and experiences.

#### **4.8.1. In your own opinion, what are the potential benefits of biodiversity offsets for conservation?**

The first question in the questionnaire addressed experts' opinions regarding what they consider to be the potential benefits of biodiversity offsets for conservation purposes. Findings from this question indicated that biodiversity offsets as conservation holds potential benefits for conservation purposes in South Africa. Biodiversity offsets are defined as '*conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure no net loss of biodiversity*' (Brownlie & Botha, 2009:227). In the opinion of the experts, the following were highlighted as the main potential benefits of biodiversity offsets; expansion of protected area estate, long-term biodiversity conservation, enhancing of ecosystem services, ensuring sustainable development and ensuring economic benefits for conservation. These potential benefits are emphasized by ten Kate and Crowe (2014:1), who stated, "*The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people's use and cultural values associated with biodiversity*".

#### **4.8.2. In your own opinion, what are the actual realized benefits of biodiversity offsets for conservation?**

The second question in the questionnaire required the participants to give opinions on the benefits that have been realized through biodiversity offsets. Biodiversity offsets are becoming an important and successful tool for biodiversity conservation in South Africa and worldwide. Despite remaining controversial (Bull, 2015), several experts in the field believe that biodiversity offsets are beneficial for conservation purposes. The following benefits emerged in the responses of the participants: preserving species and habitats, expansion of protected area estate, and providing economic benefits for conservation. South Africa contains unique biodiversity (De Witt, 2015) that requires protection from adverse environmental impacts. Biodiversity offsets have been presented globally as a tool for achieving protected area targets (Buschke *et al.*, 2017) while

ensuring no-net loss of biodiversity (De Witt *et al.*, 2019), protecting habitats (Brownlie & Botha, 2009) and providing financial support for conservation purposes (Githiru *et al.*, 2015).

#### ***4.8.3. In your own opinion, what needs to be done to effectively bridge the gap between potential and realized benefits?***

The third question presented to the participants involved bridging the gap between the potential and realized benefits of biodiversity offsets for conservation in South Africa. Findings from the analysis produced the following themes; national offset policy, government support and enforcement, the capacity of competent authorities and consultants, stakeholder involvement, biodiversity offset register and conservation banking. The findings of the analysis revealed that biodiversity offsets in South Africa have the potential to produce intended benefits only if the above-listed areas of concern are implemented. Through government support and proper monitoring and enforcement, a national policy on offsets is crucial to the success of offsets in South Africa (Lukey *et al.*, 2017). The role of government, especially the relevant departments, must be better defined and managed, and officials tasked with overseeing biodiversity offsets must be better trained and equipped to handle the authorization and implementation of biodiversity offsets (Louw, 2015). Involving relevant stakeholders in matters relating to the environment was highlighted in the findings of the analysis as crucial to the success of environmental and conservation tools. A statement by BBOP (2012) reads;

*“One major contribution to the success of biodiversity offset projects is accommodating the concerns of indigenous peoples and local communities in development decisions by companies and governments. This requires meaningful engagement from an early stage of planning, and taking an adaptive management approach where outcomes are evaluated and appropriate change made in response to feedback”*

Finally, the findings of the analysis revealed conservation banking as an alternative option that South Africa may want to explore to achieve the intended conservation benefits. According to Brownlie *et al.* (2017), conservation banking could improve consistency in offset requirements and implementation, especially given that biodiversity priority areas in South Africa are known.

#### **4.8.4. What is your opinion on the effectiveness of biodiversity offsets projects in South Africa?**

The fourth question in the questionnaire dealt with the effectiveness of biodiversity offsets in practice. Biodiversity offsets have become a popular but controversial policy tool (Maron *et al.*, 2015), applied to compensate for adverse impacts on biodiversity (BBOP, 2009; Bull *et al.*, 2013; Goncalves *et al.*, 2015) and to achieve net positive gain (Aiama *et al.*, 2015). While much has been debated regarding the advantages and challenges relating to the use of offsets as a conservation tool (Maron *et al.*, 2016), this has mostly been done in the absence of reliable information on how offsets are working in practice (Bull *et al.*, 2013; Lukey *et al.*, 2017). In this study, the participants were allowed to reflect on the effectiveness of this conservation tool based on their experiences in the field. There was no compelling difference in numbers between those that said biodiversity offsets are effective and those that said they are ineffective in South Africa. From the questionnaire findings, it was clear that biodiversity offsets are still not understood in South Africa. The lack of clearly stipulated guidelines, monitoring and enforcement by the relevant authorities is obvious in many cases. According to Brownlie *et al.* (2017), South Africa requires a clear regulatory framework to guide offsets to be effective. However, challenges affecting the success of this tool exist in practice and have been highlighted by several authors in this field, for example, Brownlie *et al.* (2017), Lukey *et al.* (2017), Bull *et al.* (2013).

#### **4.8.5. In your own opinion, what are the challenges affecting the successful implementation of biodiversity projects in South Africa?**

The fifth question in the questionnaire addressed the challenges affecting the successful implementation of biodiversity offsets in South Africa. The findings of the analysis identified several challenges from the responses. These are the legal barriers, the capacity of relevant authorities, financing offsets and suitable sites for offsets projects. Overall it is clear that most of the respondents are concerned about the lack of a guiding policy for offsets in South Africa. The management of the environment and biodiversity in South Africa falls under the Department of environment affairs, both at national and provincial levels. The functioning of the provincial departments must align with that of the national department. The absence of a national policy guiding offsets in South Africa makes it difficult for authorities and consultants to implement offsets. Brownlie *et al.* (2017:250) pointed out that “*the lack of explicit national policy, embedded*

*in an effective enabling framework, has resulted in frequently inconsistent, ad hoc and varied offset requirements and approaches”.*

On the other hand, lack of capacity in the relevant departments and among the environmental consultants is a concern. Only a handful of consultants or specialists dealing with biodiversity offsets regularly have a much clearer understanding of the legislation, both in South Africa and globally and the processes relating to biodiversity offsets. According to Louw (2015), the apparent lack of understanding relating to biodiversity offset processes and legislation in South Africa is concerning, as this is likely to allow for biodiversity offset opportunities to be missed at the operations level, as well as likely allowing activities requiring biodiversity offsets as part of their mitigation being omitted.

The questionnaire findings also highlighted the funding of offsets as a concern to the success of this tool. According to Brownlie *et al.* (2017), the resources for funding biodiversity offset projects over some time as well as the allocation of responsibility for managing the funds is one of the main challenges. BBOP (2012) clearly states that it is the developer’s responsibility to finance offsets. As things stand, however, South Africa’s legislation does not specify the duration of such responsibility. This may lead to offset projects not reaching the completion stage and providing intended results. A successful biodiversity offset structure relies on establishing funding mechanisms that are transparent and properly managed (Brownlie *et al.*, 2017).

Finding a suitable site or location for offsets presents another challenge for this tool. Biodiversity offsets have been implemented on a ‘like-for-like’ principle, but the respondents highlighted this as impossible in many parts of South Africa due to limited land available, especially in areas where major developments occur. One respondent mentioned the Northern Cape area of South Africa as an example. Gonçalves *et al.* (2015) highlight the benefits of selecting offsets sites in close proximity to development sites, one of them being the continued provision of ecosystem services through the protection of local habitats. Having pointed this out, Jenner and Balmforth (2014) pointed to the fact that it is not always possible to acquire land for offsets in close proximity to the development sites due to a number of reasons, one of them being that some of the lands could be earmarked for future developments by the government as part of enhancing the economic growth of the country. Overall, these challenges are likely to persist for an extended period of time until such a time that relevant measures are put into place to regulate offsets and have the different role-players working towards biodiversity conservation in South Africa.

#### ***4.8.6. In your experience, has biodiversity offsets contributed to the conservation effort in South Africa?***

The sixth and final question in the questionnaire addressed the contribution of biodiversity offsets towards conservation efforts in South Africa. The respondents were also required to provide examples of cases where offsets have or have not contributed to conservation in South Africa. The findings of the questionnaire revealed that biodiversity offsets have, to a certain extent, contributed positively towards conservation in South Africa, although there are still major setbacks, one of them being the absence of a national policy regulating this tool, 19 out of 25 respondents, of which ten were private environmental consultants and nine government officials, highlighted some of the positive achieved through offsets in South Africa. The majority of the respondents mentioned a number of offsets projects that have been implemented in Kwa-Zulu Natal and Western Cape Provinces, the two provinces with approved provincial guidelines on Biodiversity offsets. Through the findings from the questionnaire, the expansion of protected areas and, to a certain extent, the involvement of local communities in conservation matters are listed as some of the positive contributions of this tool in South Africa.

#### **4.9 CHAPTER SUMMARY**

In this chapter, the main findings of the questionnaire were presented and discussed. The opinions and perceptions of the participants regarding the benefits and value of biodiversity offsets in South Africa were explored and interpreted. The potential benefits, perceived realized benefits, as well as ways to bridge the gap between these benefits were discussed. The strengths and weaknesses of biodiversity offsets in South Africa, together with recommendations put forward by the participants were also presented. These discussions could contribute as additional information to the ongoing debate regarding what the actual value of biodiversity offsets is for conservation purposes in South Africa.

## **CHAPTER 5**

### **5. OVERVIEW, SIGNIFICANCE OF THE STUDY, SUMMARY OF FINDINGS, LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 INTRODUCTION**

This chapter presents the overview of the study, conclusions and recommendations to the study based on the results of the data analysis.

#### **5.2 OVERVIEW OF THE STUDY**

The main aim and objective of this research was to investigate the perceived benefits of biodiversity offsets for conservation in South Africa. Three key research questions were formulated to address the aim and objective of this research:

1. What are the potential benefits of biodiversity offsets for conservation?
2. What are the actual realized benefits of biodiversity offsets for conservation?
3. What needs to be done to effectively bridge the gap between potential and realized benefits?

From these three questions, additional supplementary questions were formulated and a questionnaire was drafted and emailed to the participants. The subsequent chapters outlined in this dissertation examined and addressed, in different ways, the aim and objective of this study.

CHAPTER ONE: This chapter outlined the background to this research, by specifying the research aim and objective, and laying out the structure of this research.

CHAPTER TWO discussed and examined the rationale for the research design and methodology. This chapter also outlined the data collection procedures and instrument used for collecting data, as well as the study area.

CHAPTER THREE provided a review of the relevant literature relating to the topic of discussion as well as all other relevant legislative frameworks, both in South Africa and globally dealing with biodiversity related matters. This review was carried out in order to provide a theoretical understanding of the topic of discussion and a basis for developing the research approach used.

CHAPTER FOUR presented and discussed the results of the data analysis. Some of the results were presented in graphs to make for better reading.

CHAPTER FIVE provided an overview of the research, significance of the study, summary of findings, as well as the conclusions drawn based on the results of the data analysed. This chapter also provided the recommendations to make biodiversity offsets successful in South Africa, as well as recommendations for future studies.

### **5.3 SIGNIFICANCE OF THE STUDY**

This study is significant due to the fact that biodiversity offsets as a conservation tool is subjected to critics by many role players in the field of biodiversity conservation. This is mainly due to their value towards conservation not known and measurable. Global biodiversity is under immense pressure from developments, and many instruments have been employed to mitigate against this loss of biodiversity or the negative impacts that developments and many other human related activities have on the environment and biodiversity to be more specific. This study aims to contribute positively towards the debate around the value of this tool, more especially for conservation of biodiversity in South Africa. The opinions and perceptions of the participants gathered through the data collection process and analysed in this study is therefore very vital towards these debates.

### **5.4 SUMMARY OF FINDINGS**

This section summarizes the main findings of the study. The aim and objective of this study was to investigate the perceived benefits of biodiversity offsets for conservation in South Africa. The research questions were formulated to address the aim and objective of this study and data was collected through the use of an online questionnaire.

The data analysed and discussed from the online questionnaire suggested that, the implementation and practice of biodiversity offsets in South Africa is still not well understood, more especially at governance level and as a results, the benefits are still not convincing enough. The results of the analysis showed that although success has been achieved in some of the offsets projects; there are obvious factors affecting the success of this tool in South Africa. This factors include the absence of national policy, database for offsets specialists and register for offsets projects; as well as the lack of capacity and funding more especially at governance level. The

involvement of the relevant stakeholders has also been highlighted as one of the contributing factors affecting the success of biodiversity offsets in South Africa.

## **5.5 LIMITATIONS OF THE STUDY**

The sampled population for this study was not known hence the sample size was small. Many factors affected the sample size, the main one being that currently in South Africa, the data base for biodiversity offset specialists is non-existing. Another limitation to this study is that the conclusions drawn in this study only reflect the opinions and perceptions of the participants. This is because South Africa does not have national register for recording previous offset projects so as to measure the success of this tool and to compare studies with. It should also be borne in mind that the data collected for this study were taken before a draft national biodiversity guidelines on offset was instituted and gazetted. The Draft National Biodiversity Offset Guideline was later gazetted on 25th March 2022 (GG-46088); this was done after the completion of this study. The implementation of biodiversity offsets in South Africa relied on the provisions contained in the provincial biodiversity offset guidelines, namely *Concise guideline for biodiversity offsets: KwaZulu-Natal Province, South Africa* and *Western Cape Guideline on Biodiversity Offsets*.

As a result of this limitations, further studies on biodiversity offsets obviously need to be conducted and be much more broadly based; to better contribute towards the debates on the benefits of this tool for conservation purposes in South Africa. The current national biodiversity offset guidelines need to be scrutinized further for strengths and weaknesses.

## **5. 6 CONCLUSIONS**

The study aimed to investigate the perceived benefits of biodiversity offsets for conservation in South Africa. This was achieved by tapping into the experts' experiences in the field of biodiversity offsets. The online questionnaire with six questions was used to collect the data required for the study. Twenty-five meaningful responses were received and analysed further to generate discussions and draw conclusions to the study. Although biodiversity offsets have been practised in South Africa for almost two decades now, the study highlighted this tool's existing challenges. It is clear from the study findings that the concept of biodiversity offsets in South Africa is well understood, even though the legal framework does not fully support the implementation of this tool. Lack of support at the governance level was highlighted as one of the contributing factors

resulting in the many challenges encountered in practice. This then justifies the many critics surrounding the value and contribution of this tool to conserve biodiversity both globally and in South Africa. The absence of a national policy to guide offsets, the absence of a biodiversity offset register, lack of adequate skills, capacity and financing mechanisms continue to overshadow the actual benefits that this tool aims to provide. These challenges were highlighted through the responses of the respondents.

South Africa is one of the countries in the world with unique biodiversity, and the conservation of this unique resource needs to be prioritized. The participants stressed the need to involve all relevant stakeholders in conservation-related matters to safeguard South Africa's biodiversity. The study also highlighted loopholes in the current laws dealing with environmental management instruments employed to mitigate against adverse impacts on biodiversity and the environment as a whole. Currently, the NEMA gives guidance to the management of biodiversity and environmental related matters in South Africa, but the lack of enforcement continues to threaten biodiversity conservation in South Africa.

In conclusion, biodiversity offsets can benefit the conservation of biodiversity in South Africa, even though the study recognizes the many concerns raised by the participants, especially regarding the policy vacuum. The recently published national biodiversity offset guideline can therefore assist in addressing some of the concerns raised in this study. Therefore, a great deal of support is required at the governance level to ensure that offsets have a much better chance of producing the desired outcomes for biodiversity conservation in South Africa.

## **5.7 RECOMMENDATIONS**

In this section, the study put forward the recommendations based on the finding of the study, informed by the participants' opinions.

### ***5.7.1 National Policy for biodiversity offsets***

The issue of policy vacuum has been highlighted throughout this study as a major hindrance to the effectiveness of offsets. Currently, offset projects are implemented in line with the EIA regulations (De Witt *et al.*, 2019), but there is no actual guidance regarding this tool's timing, duration, design, and implementation (Brownlie *et al.*, 2017). The drafting and the actual adoption of this policy into law should be accelerated to guide offsets in South Africa. Without a national

policy guiding offsets projects in all the provinces in South Africa, the benefits of this tool towards the conservation of biodiversity in South Africa will never be realized.

### **5.7.2 Long term management and monitoring of offset Sites**

Biodiversity offsets as a conservation tool aim for a no-net loss of biodiversity (ten Kate *et al.*, 2004) through long term management of critical biodiversity areas (Brownlie & Botha, 2009). Thorough monitoring and auditing of offsets sites by the relevant skilled officials should be done regularly and consistently to achieve the desired goals and benefits towards conservation. According to Villarroya (2014:11), "Monitoring is a way of ensuring compliance with policy requirements, evaluating the achievement of the mitigation goals, and getting feedback on the effectiveness of the activities implemented". The research recommends that the environmental authorization for development projects include watertight clauses on the recourse in the event of mismanagement or negligence to ensure long-term management and monitoring of offset sites. This will ensure accountability on the part of the developers.

### **5.7.3 Capacity building**

The majority of the respondents, both government officials and private environmental consultants, highlighted the lack of capacity and skills as a significant factor affecting South Africa's biodiversity offsets. "Inadequate resourcing of government departments and agencies is commonplace in South Africa and raises questions regarding the long-term management, monitoring and enforcement of offsets where responsibility for particular activities sits with the government" (Jenner & Balmforth, 2015). Although biodiversity offsets are still regarded as a 'new' concept in the South African biodiversity conservation arena, the study has indicated that the majority of the private environmental consultants have been involved in a number of offsets projects in their respective provinces, especially Northern Cape and the Western Cape and as results, a programme that ensures everyone is on the same page should be considered. The relevant government departments authorizing development projects should acquire more personnel with adequate skills to deal with offset projects.

#### **5.7.4 Funding**

The funding of offset projects is the responsibility of the developer (Brownlie *et al.*, 2017), and therefore securing long-term financing of offset projects is key to the success of this tool. The study also highlighted that most developers do not avail sufficient funding to carry out the offset project to a point where it produced the desired benefits. “A successful national offsetting framework depends crucially on early establishment of financing vehicles that are simple to use, transparent and securely governed” (Jenner & Balmforth, 2015: 10). According to Brownlie *et al.* (2017), clarity regarding institutional and financial arrangements once the developer’s responsibility for offsets has ended is needed. The research recommends that financial commitments between the relevant government department and the developer should be concluded before commencing with developments.

#### **5.7.5 Public Involvement**

Public or stakeholder involvement is one of the main principles of biodiversity offsets. The study highlighted the need for involving the public and all other relevant stakeholders in offset and conservation-related projects. South Africa is a developing country with high socio-economic challenges (Lukey *et al.*, 2017), and as a result, offset projects should be designed and implemented to benefit the communities around the development sites. Biodiversity provides benefits that are vital for communities (Mnisi, 2020). Some of the land with critical biodiversity is under the steward of communities and private individuals, and their inclusion in the decision-making process is vital for securing offset sites with critical biodiversity instead.

#### **5.7.6 National Biodiversity offset register**

According to Brownlie *et al.* (2017), a register for offset projects containing details of the developer, the agent managing the offset site and details of the acquired site is essential to ensure transparency and accountability. The study has also highlighted the absence of a register as one of the factors influencing mismanagement and negligence of offsets projects. The research recommends the introduction of a national register for offsets to measure the success and effectiveness of this tool in South Africa.

## REFERENCES

- Abdo, L., Kemp, A., Coupland, G., & Griffin, S. 2019. Biodiversity offsets can be a valuable tool in achieving sustainable development: Developing a holistic model for biodiversity offsets that incorporates environmental, social and economic aspects of sustainable development. *Journal of Sustainable Development*, 12 (5).
- Afrika, R.V.S. 2016. Government Gazette Staatskoerant. Cell, 82(859), p.4910.
- Aiama, D., Edwards, S., Bos, G., Ekstrom, J., Krueger, L., Quétier, F., ... Bennun, L., 2015. No Net Loss and Net Positive Impact Approaches for Biodiversity: exploring the potential application of these approaches in the commercial agriculture and forestry sectors. *International Union for Conservation of Nature*.
- Akcakaya, H. R., S. H. Butchart, J. E. Watson, & R. G. Pearson. 2014. Preventing Species Extinctions Resulting from Climate Change. *Nature Climate Change* 4: 1048– 1049. doi:10.1038/nclimate2455
- Akhtar, D.M.I. 2016. Research design. *Research Design (February 1, 2016)*.
- Alberts, R.C., Retief, F.P., Roos, C., Cilliers, D.P. & Arakele, M. 2020. Re-thinking the fundamentals of EIA through the identification of key assumptions for evaluation. *Impact Assessment and Project Appraisal*, 38(3), pp.205-213.
- Alhojailan, M.I. 2012. Thematic analysis: A critical review of its process and evaluation. *West East Journal of Social Sciences*, 1(1), pp.39-47.
- Ali, M., Kennedy, C.M., Kiesecker, J. & Geng, Y. 2018. Integrating biofiversity offsets within Circular Economy policy in China. *Journal of Cleaner Production*, 185, pp.32-43.
- Almalki, S. 2016. Integrating Quantitative and Qualitative Data in Mixed Methods Research— Challenges and Benefits. *Journal of Education and Learning*. 5:288-296.
- Arlidge, W.N., Bull, J.W., Addison, P.F., Burgass, M.J., Gianuca, D., Gorham, T.M., ... Wilcox, C. 2018. A global mitigation hierarchy for nature conservation. *BioScience*, 68(5), pp.336-347.
- BBOP [Business and Biodiversity offsets Programme]. 2013. To No Net Loss and Beyond: An Overview of the Business and Biodiversity offsets Programme. BBOP, Washington, D.C.

Accessed 23 August 2021 from [https://cms.fauna-flora.org/wp-content/uploads/2017/12/FFI\\_2015\\_The-Mitigation-Hierarchy.pdf](https://cms.fauna-flora.org/wp-content/uploads/2017/12/FFI_2015_The-Mitigation-Hierarchy.pdf)

BBOP [Business and Biodiversity Offset Programme. 2012. Biodiversity offsets]: Principles, criteria and indicators. BBOP. Washington, DC. Available from: <http://bbop.forest-trends.org/pages/guidelines>

BBOP [Business and Biodiversity Offsets Programme]. 2009. Biodiversity Offsets and Stakeholder Participation: A BBOP Resource Paper. BBOP, Washington, D.C.

BBOP. 2009. The relationship between biodiversity offsets and impact assessment. A BBOP Resource Paper. Business and Biodiversity Offsets Programme (BBOP), Washington, D.C.

Bellard, C., Bertelsmeier, C., Leadley, P., Thuiller, W. & Courchamp, F. 2012. Impacts of climate change on the future of biodiversity. *Ecology letters*, 15(4), pp.365-377.

Bishop, J., Kapila, S., Hicks, F. & Mitchell, P. 2006. Building Biodiversity Business: Report of a Scoping Study. Shell International Limited and the World Conservation Union, London, UK and Gland, Switzerland.

Blackmore, A. 2015. The relationship between the NEMA and the public trust doctrine: The importance of the NEMA principles in safeguarding South Africa's biodiversity'. *South African Journal of Environmental Law and Policy*, 20(2), pp.89-118.

Bland, L. M., B. Collen, C. D. L. Orme, & J. Bielby. 2015. Predicting the Conservation Status of Data-Deficient Species. *Conservation Biology* 29: 250–259. doi:10.1111/ cobi.12372

Bradshaw, C.J., Ehrlich, P.R., Beattie, A., Ceballos, G., Crist, E., Diamond, J., ... Pyke, G. 2021. Underestimating the challenges of avoiding a ghastly future. *Frontiers in Conservation Science*, 1, p.9.

Brown, V. & Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), pp.77-101.

Brown M.A., Clarkson B.D., Stephens T. & Barton B.J. 2014. Compensating for ecological harm – the state of play in New Zealand. *New Zealand J Ecol.* 38:139–146.

Brownlie, S. & Botha, M. 2009. Biodiversity offsets: adding to the conservation estate, or 'no net loss'?, *Impact Assessment and Project Appraisal*, 27:3, 227-231.

Brownlie, S., King, N. & Treweek, J. 2013. Biodiversity tradeoffs and offsets in impact assessment and decision making: can we stop the loss?. *Impact Assessment and Project Appraisal*, 31(1), pp.24-33.

Brownlie, S., von Hase, A., Botha, M., Manuel, J., Balmforth, Z. & Jenner, N. 2017. Biodiversity offsets in South Africa—challenges and potential solutions. *Impact Assessment and Project Appraisal*, 35(3), pp.248-256.

Bruner, A.G., Gullison, R.E. & Balmford, A. 2004. Financial costs and shortfalls of managing and expanding protected-area systems in developing countries. *BioScience*, 54, 1119-1126.

Bull, J.W., Hardy, M.J., Moilanen, A. & Gordon, A. 2015. Categories of flexibility in biodiversity offsetting, and their implications for conservation. *Biological Conservation*, 192, pp.522-532.

Bull, J.W., Suttle, K.B., Gordon, A., Singh, N.J. & Milner-Gulland, E.J. 2013. Biodiversity offsets in theory and practice. *Oryx*, 47(3), pp.369-380.

Buschke, F.T., Brownlie, S. & Manuel, J. 2019. The conservation costs and economic benefits of using biodiversity offsets to meet international targets for protected area expansion. *Oryx*, 53(4), pp.732-740.

Calvet, C., Napoléone, C. & Salles, J.M. 2015. The biodiversity offsetting dilemma: between economic rationales and ecological dynamics. *Sustainability*, 7(6), pp.7357-7378.

Campos-Silva, J.V., Peres, C.A., Antunes, A.P., Valsecchi, J. & Pezzuti, J. 2017. Community-based population recovery of overexploited Amazonian wildlife. *Perspectives in Ecology and Conservation*, 15(4), pp.266-270.

CBD (Convention on Biological Diversity). 2019. COP 7 Decision VII/ 30. <https://www.cbd.int/decision/cop/?id=7767>

CBD (Convention on Biological Diversity). 2014. Global biodiversity outlook 4. Montréal: Secretariat of the Convention on Biological Diversity.

CBD. 1992. Convention on Biological Diversity. United Nations.

Chape, S., Blyth, S., Fish, L., Fox, P., Spalding, M., (Compilers). 2003. United Nations List of PAs. IUCN: Gland, Switzerland and Cambridge, UK and UNEP-WCMC, Cambridge, UK

Chee, Y.E. 2015. Principles underpinning biodiversity offsets and guidance on their use. *Handbook of road ecology*, pp.51-59.

Cilliers, D.P., Van Staden, I., Roos, C., Alberts, R.C. & Retief, F.P. 2020. The perceived benefits of EIA for government: a regulator perspective. *Impact Assessment and Project Appraisal*, 38(5), pp.358-367.

CITES. 2010. Appendix I. Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). <<http://www.cites.org/eng/app/appendices.shtml>>.

Coad, L., Watson, J.E., Geldmann, J., Burgess, N.D., Leverington, F., Hockings, M., ... Di Marco, M. 2019. Widespread shortfalls in protected area resourcing undermine efforts to conserve biodiversity. *Frontiers in Ecology and the Environment*, 17(5), pp.259-264.

Cooper, D.R. & Schindler, P.S. 2014. *Business research methods*. Twelfth edition. New York, NY: McGraw-Hill

Coetzee, B.W.T., Gaston, K.J. & Chown, S.L. 2014. Local scale comparisons of biodiversity as a test for global protected area ecological performance: a meta-analysis. *PLoS ONE* 9 (8), e105824. <http://dx.doi.org/10.1371/journal.pone.0105824>

Creswell, J.H. 2009. *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*, 3rd ed., Sage Publications, Los Angeles.

Creswell, J. W. 2012. *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston, MA: Pearson Education, Inc

Cuni-Sanchez, A., Pfeifer, M., Marchant, R. & Burgess, N.D. 2016. Ethnic and locational differences in ecosystem service values: insights from the communities in forest islands in the desert. *Ecosystem. Serv.* 19, 42–50. <http://dx.doi.org/10.1016/j.ecoser.2016.04.004>.

DEA (Department of Environmental Affairs). 2010. *Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 5*, Department of Environmental Affairs (DEA), Pretoria, South Africa ISBN

DEA & DP 2015. *Western Cape Guideline on Biodiversity Offsets*. Prepared by Susie Brownlie and Mark Botha for DEA & DP, Cape Town

DEAT (Department of Environmental Affairs and Tourism). 2004. *Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7*, Department of Environmental Affairs and Tourism (DEAT), Pretoria. Jacob, C., Vaissiere, A.C., Bas, A. & Calvet, C. 2016.

Investigating the inclusion of ecosystem services in biodiversity offsetting. *Ecosystem Services*, 21, pp.92-102.

DFFE (Department of Forestry, Fisheries and the Environment). 2021. National Biodiversity Offset Guideline.

de Oliveira, J.P., Balaban, O., Doll, C.N., Moreno-Peñaranda, R., Gasparatos, A., Iossifova, D. & Suwa, A. 2011. Cities and biodiversity: Perspectives and governance challenges for implementing the convention on biological diversity (CBD) at the city level. *Biological Conservation*, 144(5), pp.1302-1313.

de Souza, A.C. & Prevedello, J.A. 2020. The importance of protected areas for overexploited plants: Evidence from a biodiversity hotspot. *Biological Conservation*, 243, p.108482.

De Witt, M. 2015. A critical analysis of biodiversity offsets in South Africa (Doctoral dissertation, North-West University (South Africa), Potchefstroom Campus).

De Witt, M., Pope, J., Retief, F., Bond, A., Morrison-Saunders, A. & Steenkamp, C. 2019. Biodiversity offsets in EIA: Getting the timing right. *Environmental Impact Assessment Review*, 75, pp.1-12.

Denzin, N. K. & Lincoln, Y. S. 2005. The discipline and practice of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (3rd ed., pp. 1-32). Thousand Oaks, CA: Sage.

Driver, A., Sink, K.J., Nel, J.L., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., Majiedt, P.A., Harris, L. & Maze, K. 2012. National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems.

Durrheim, K. 2006. Research design. *Research in practice: Applied methods for the social sciences*, 2, pp.33-59.

Egoh, B.N. 2009. Integrating ecosystem services into conservation planning in South Africa (Doctoral dissertation, Stellenbosch: University of Stellenbosch).

Egoh, B.N., Reyers, B., Carwardine, J., Bode, M., O'FARRELL, P.J., Wilson, K.A., ... Cowling, R.M., 2010. Safeguarding biodiversity and ecosystem services in the Little Karoo, South Africa. *Conservation Biology*, 24(4), pp.1021-1030.

Elliott, V. 2018. Thinking about the Coding Process in Qualitative Data Analysis, *The Qualitative Report*, vol. 23, no. 11, pp. 2850-2861.

Ezemvelo KZN Wildlife. 2010. Concise guideline for biodiversity offsets: KwaZulu-Natal Province, South Africa.

Fallding, M. 2014. Biodiversity offsets: practice and promise. *Environmental and Planning Law Journal*, 31(1), pp.11-33.

Foley, J., Baijnath, H. & McCracken, D.P. 2018. Understanding Durban University of Technology Students' Perceptions of Biodiversity Loss. *Southern African Journal of Environmental Education*, 34.

Friese, S. 2014. Methods and methodologies for qualitative data analysis.

Gardner, T.A., Von Hase, A., Brownlie, S., Ekstrom, J.M., Pilgrim, J.D., Savy, C.E., ... ten Kate, K. 2013. Biodiversity Offsets and the challenge of achieving no net loss. *Conservation Biology*, 27(6), pp.1254-1264.

Gaston, K.J. & Spicer, J.I. 2013. *Biodiversity an introduction*. John Wiley & Sons.

Gibson, R.B. 2013. Avoiding sustainability trade-offs in environmental assessment. *Impact Assessment and Project Appraisal*, 31(1), pp.2-12.

Githiru, M., King, M.W., Bauche, P., Simon, C., Boles, J., Rindt, C. & Victurine, R. 2015. Should biodiversity offsets help finance underfunded protected areas. *Biological Conservation*, 191, pp.819-826.

Gonçalves, B., Marques, A., Soares, A.M.V.D.M. & Pereira, H.M. 2015. Biodiversity Offsets: from current challenges to harmonized metrics. *Current Opinion in Environmental Sustainability*, 14, pp.61-67.

Government of South Africa. 2015. *National Biodiversity Strategy and Action Plan*, Department of Environmental Affairs, Pretoria.

Grimm, M. & Köppel, J. 2019. Biodiversity offset program design and implementation. *Sustainability*, 11(24), p.6903.

Habibullah, M.S., Din, B.H., Tan, S.H. & Zahid, H. 2021. Impact of climate change on biodiversity loss: global evidence. *Environmental Science and Pollution Research*, pp.1-14.

Hilborn, R. & Sinclair, A.R. 2021. Biodiversity protection in the 21st century needs intact habitat and protection from overexploitation whether inside or outside parks. *Conservation Letters*, 14(4).

Hoffman, A.R. 2007. 'An Appraisal of the Quality of Mining EIA Reports', MSc Dissertation, North-West University, Potchefstroom.

Hoffmann, M., Hilton-Taylor, C., Angulo, A., Böhm, M., Brooks, T.M., Butchart, S.H., ... Darwall, W.R., 2010. The impact of conservation on the status of the world's vertebrates. *science*, 330(6010), pp.1503-1509.

Hrabanski, M. 2015. The Biofiversity offsets as market-based instruments in global governance: Origins, success and controversies. *Ecosystem services*, 15, pp.143-151. [http://www.unep-wcmc.org/protected\\_areas/categories/~main](http://www.unep-wcmc.org/protected_areas/categories/~main). Accessed on 26 October 2021

IUCN (World Conservation Union). 1992. Report of the working group on application of the World Heritage Convention to islands of the Southern Ocean. M Miscellaneous report. Gland, Switzerland.

IUCN (International Union for Conservation of Nature). 2012. Independent report on biodiversity offsets. *Prepared by The Biodiversity*.

IUCN. 2012. Guidelines for application of IUCN Red List criteria at regional and national levels: Version 4.0. IUCN, Gland and Cambridge.

IUCN (International Union for Conservation of Nature). 2016. Draft Biodiversity Offset Policy. IUCN, Gland, Switzerland. <Http://www.iucn.org/theme/business-and-biodiversity/resources/browse-conservation-issue/biodiversity-offsets>. Last accessed 20 April 2021.

IUCN (International Union for Conservation of Nature). 2020. IUCN Definitions - English. Available at: <[https://www.iucn.org/sites/dev/files/iucn-glossary-of-definitions\\_en.pdf](https://www.iucn.org/sites/dev/files/iucn-glossary-of-definitions_en.pdf)>. Last accessed 20 April 2021. IUCN Protected Area Categories.

Jepthas, G., & Swanepoel, J. W. 2019. Implications of The Environmental Impact Assessment Regulations On The Agricultural Sector In The Overberg District In The Western Cape For Emerging Farmers. *South African Journal of Agricultural Extension*, 47(2), 128-139. <https://dx.doi.org/10.17159/2413-3221/2019/v47n2a509>

- Jenner, N. & Balmforth, Z. 2015. Biodiversity Offsets: Lessons learnt from policy and practice. Fauna and Flora International, Cambridge, UK. [http://www. fauna-flora. org/](http://www.fauna-flora.org/). Accessed 23 April 2021.
- Kidd, M. & Retief, F. 2009. Environmental Assessment, in Strydom, H.A. and King, N.D. (eds). Environmental Management in South Africa, 2nd ed. Juta Law: Cape Town.
- Kiger, M.E. & Varpio, L. 2020. Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical teacher*, 42(8), pp.846-854.
- Klopper RR, Smith GF & Van Rooy, J. 2002. The biodiversity of Africa. Rebirth of Science in Africa: A shared vision for life and Environmental Sciences. Umदाus Press, Hatfield: 60-86.
- Komape, D.M. 2019. Spatial assessment of *Saccharum* species hybrids and wild relatives in eastern South Africa (Doctoral dissertation, North-West University (South Africa)).
- Ladner, K.E. 2017. Population Genetics of the Giant Red Centipede Along the Appalachian Mountains (Doctoral dissertation, The University of Mississippi).
- Lapeyre, R., Froger, G. & Hrabanski, M. 2015. Biodiversity Offsets as market-based instruments for ecosystem services? From discourses to practices. *Ecosystem services*, 15, pp.125-133.
- Lindenmayer, D.B., Crane, M., Evans, M.C., Maron, M., Gibbons, P., Bekessy, S. & Blanchard, W. 2017. The anatomy of a failed offset. *Biological Conservation*, 210, pp.286-292.
- Longhurst, R. 2003. Semi-structured interviews and focus groups. *Key methods in geography*, 3(2), pp.143-156.
- Louw, E.W. 2015. Assessing the Effectiveness of Current Biodiversity Offset Strategies in South Africa: A Case Study on Current Perceptions and Views in the Mining Industry. University of Johannesburg (South Africa).
- Lukey, P., Cumming, T., Paras, S., Kubiszewski, I. & Lloyd, S. 2017. Making Biodiversity Offsets work in South Africa—A governance perspective. *Ecosystem services*, 27, pp.281-290.
- Maron, M., Gordon, A., Mackey, B.G. & Watson, J.E.M. 2015. Conservation: Stop misuse of biodiversity offsets. *Nature* 22, 401–403.
- Maron, M., Gordon, A., Mackey, B.G., Possingham, H.P. & Watson, J.E. 2016. Interactions between bo and protected area commitments: avoiding perverse outcomes. *Conservation Letters*, 9(5), pp.384-389.

- May, J., Hobbs, R.J. & Valentine, L.E. 2016. Are offsets effective? An evaluation of recent environmental offsets in Western Australia. *Biological Conservation*, 206, pp.249-257.
- McDonald, J., McCormack, P. C., & Foerster, A. 2016. Promoting resilience to climate change in Australian Conservation Law: The case of Biodiversity Offsets. *UNSW Law Journal*, 39(4), 1612-1651.
- McNeely, J.A. (ed.). 2001. *The great reshuffling: human dimensions of invasive alien species*. IUCN.
- McKenney, B. & Kiesecker, J. 2010. Policy Development for Biodiversity Offsets: A Review of Offset Frameworks. *Environmental Management* 45, 165-176.
- McMillan, J. H. & Schumacher, S. 2001. *Research in education: A conceptual introduction* (5<sup>th</sup> ed.). New York: Longman.
- Midgley, D. 2015. Biodiversity Offsets: Towards an effective legal framework in South Africa (Master's thesis, University of Cape Town).
- Midgley, G., & W. J. Bond. 2015. Bond Future of African Terrestrial Biodiversity and Ecosystems under Anthropogenic Climate Change. *Nature Climate Change* 5: 823–829. doi:10.1038/nclimate2753
- Miles, M.B. & Huberman, A.M. 1994. *Qualitative data analysis: an expanded sourcebook*. Sage Publications.
- Mittermeier RA & Mittermeier GC. 1997. Earth's biologically wealthiest nations. (In Wilhelm-Rechmann A, Cowling RM, 2013. *Local land-use planning and the role of conservation: An example analysing opportunities*. *South African Journal of Science* 109: 1-6).
- Mnisi, P.T. 2020. The context and approaches of biodiversity conservation: a debate of its impacts on poverty alleviation in communities close to Skukuza Game Reserve, South Africa. *International Conference on Public Administration and Development Alternatives (IPADA)*.
- Moilanen, A. & Laitila, J. 2015. Indirect leakage leads to a failure of avoided loss biodiversity offsetting. *Journal of Applied Ecology*, 53(1) 106-111. <https://doi.org/10.1111/1365-2664.12565>
- Montgomery, D.S. 2015. The efficacy of environmental impact assessment on development proposals with respect to cost and time in South Africa: A three case study review. MSc Thesis, University of Witwatersrand.

- Morgan, D.L. 1998. Practical strategies for combining qualitative and quantitative methods: Applications to health research. *Qualitative health research*, 8(3), pp.362-376.
- Moshobane, M. C., Mukundamago, M., Adu-Acheampong, S., & Shackleton, R. 2019. Development of alien and invasive taxa lists for regulation of biological invasions in South Africa. *Bothalia*, 49(1), 1–12. <https://doi.org/10.4102/abc.v49i1.2361>
- Moshobane, M.C., Nnzeru, L.R., Nelukalo, K. & Mothapo, N.P. 2020. Patterns of permit requests and issuance for regulated alien and invasive species in South Africa for the period 2015-2018. *African Journal of Ecology*, 58(3), pp.514-528.
- Mubanga, R.O. & Kwarteng, K. 2020. A comparative evaluation of the environmental impact assessment legislation of South Africa and Zambia. *Environmental Impact Assessment Review*, 83, p.106401.
- Ncube, N.B. 2015. Comparing the equator principles' IFC performance standard and the South African mining and biodiversity guideline to identify areas of overlap and gaps to improve biodiversity conservation in the mining sector (Doctoral dissertation).
- Osborne, B.N. 2015. A critical evaluation of the concept of sustainable development as applied in the legislation governing environmental impact assessments in South Africa (Case studies: Housing developments). D-Tech thesis, Cape Peninsula University of Technology
- Pilgrim, J.D. & Bennun, L. 2014. Will biodiversity offsets save or sink protected areas? *Conservation Letters*, 7, 423-424.
- Pilgrim, J.D., Brownlie, S., Ekstrom, J.M.M., Gardner, T.A., von Hase, A., ten Kate, K., ... Ussher, G.T. 2013. A process for assessing the offsetability of biodiversity impacts. *Conservation Letters*, 7, 376-384.
- Pacifici, M., Foden, W.B., Visconti, P., Watson, J.E., Butchart, S.H., Kovacs, K.M., ... Corlett, R.T., 2015. Assessing species vulnerability to climate change. *Nature climate change*, 5(3), pp.215-224.
- Queirós, A., Faria, D. & Almeida, F. 2017. Strengths and limitations of qualitative and quantitative research methods. *European Journal of Education Studies*.
- Quintero, J.D. & Mathur, A. 2011. Biodiversity Offsets and infrastructure. *Conservation Biology*, 25(6), pp.1121-1123.

- Raimondo, D. 2011. The Red List of South African plants-a global first. *South African Journal of Science*, 107(3), pp.1-2.
- Rantlo, T.J. 2015. Environmental impact assessment legislation in Lesotho, Swaziland and South Africa. Dissertation submitted in partial fulfilment of the requirements for the degree Magister Legum in Environmental Law at the Potchefstroom Campus of the North-West University.
- Redford, K.H. & Richter, B.D. 1999. Conservation of biodiversity in a world of use. *Conservation biology*, 13(6), pp.1246-1256.
- Retief, F.P., Fischer, T.B., Alberts, R.C., Roos, C. & Cilliers, D.P. 2020. An administrative justice perspective on improving EIA effectiveness. *Impact Assessment and Project Appraisal*, 38(2), pp.151-155.
- Richardson, D. M., Pys̃ek, P. & Carlton, J. T. 2011. A compendium of essential concepts and terminology in biological invasions. In *Fifty Years of Invasion Ecology: The Legacy of Charles Elton* (ed. D. M. Richardson), pp. 409–420. Blackwell Publishing, Oxford.
- RSA (Republic of South Africa). 1989. Environment Conservation Act, no. 73 of 1989. <http://www.polity.org.za>
- RSA (Republic of South Africa). 1998. National Environmental Management Act, No 107 of 1998 (Government Gazette, Cape Town).
- Reynolds, C. & Ryan, P.G. 2018. Micro-plastic ingestion by waterbirds from contaminated wetlands in South Africa. *Marine pollution bulletin*, 126, pp.330-333.
- Sandham, L.A., Van Heerden, A.J., Jones, C.E., Retief, F.P. & Morrison-Saunders, A.N. 2013. Does enhanced regulation improve EIA report quality? Lessons from South Africa. *Environmental Impact Assessment Review*, 38, pp.155-162.
- Saunders, M., Lewis, P. & Thornhill, A. 2016. *Research methods for business students*. Seventh edition. Edinburgh Gate: Pearson Education.
- Schonlau, M., Gweon, H. & Wenemark, M. 2021. Automatic classification of open-ended questions: check-all-that-apply questions. *Social Science Computer Review*, 39(4), pp.562-572.
- SCBD. 2010. *Global Biodiversity Outlook 3*. Secretariat of the Convention on Biological Diversity (SCBD), Montreal.

- Schulp, C.J., Van Teeffelen, A.J., Tucker, G. & Verburg, P.H. 2016. A quantitative assessment of policy options for no net loss of biodiversity and ecosystem services in the European Union. *Land Use Policy*, 57, pp.151-163.
- Seebens, H., Blackburn, T.M., Dyer, E.E., Genovesi, P., Hulme, P.E., Jeschke, J.M., ... Bacher, S. 2017. No saturation in the accumulation of alien species worldwide. *Nature communications*, 8(1), pp.1-9.
- Sintayehu, D.W. 2018. Impact of climate change on biodiversity and associated key ecosystem services in Africa: a systematic review. *Ecosystem health and sustainability*, 4(9), pp.225-239.
- Sinthumule, N.I. 2017. Resistance against conservation at the South African section of Greater Mapungubwe (trans) frontier. *Africa Spectrum*, 52(2), pp.53-77.
- Skowno, A.L., Poole, C.J., Raimondo, D.C., Sink, K.J., Van Deventer, H., Van Niekerk, L., ... Driver, A. 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. pp. 1–214.
- South Africa. 1996. Constitution of the Republic of South Africa.
- South Africa. 1998. National Environmental Management Act (Act 107 of 1998). Pretoria. Government Gazette, 19519, 27 November 1998.
- South Africa. 2003. National Environmental Management: Protected Areas Act (Act 57 of 2003). Government Gazette, 37802, 11 February 2004.
- South Africa. 2004. National Environmental Management: Biodiversity Act (Act 10 of 2004). Pretoria. Government Gazette, 26436, 7 June 2004.
- South African National Biodiversity Institute (SANBI). 2014. Factsheet on biodiversity stewardship. 1st ed. Pretoria: SANBI. Available from: <http://www.sanbi.org/sites/default/files/documents/documents/biodiversity-stewardshipfactsheet.pdf>. Accessed 23 April 2021.pdf
- Starke, L. 2004. Integrating Mining and Biodiversity Conservation Case Studies from around the World.
- Supple, M.A. & Shapiro, B. 2018. Conservation of biodiversity in the genomics era. *Genome Biology*, 19(1), pp.1-12.

Suri, H. 2011. Purposeful sampling in qualitative research synthesis. *Qualitative research journal*.

ten Kate, K., Bishop, J. & Bayon, R. 2004. *Biodiversity Offsets Views, experience, and the business case*. IUCN--The World Conservation Union.

ten Kate, K. & Crowe, M.L.A. 2014. *Biodiversity Offsets: policy options for governments*. An input paper for the IUCN technical study group on biodiversity offsets. Gland: IUCN. 91 pp.

ten Kate, K., von Hase, A. & Maguire, P., 2018. *Principles of the Business and Biodiversity Offsets Programme*. In BO (pp. 17-26). Springer, Cham.

Thomas, C. D., A. Cameron, R. E. Green, M. Bakkenes, L. J. Beaumont, Y. C. Collingham, B. F.N. & Erasmus. 2004. Extinction Risk from Climate Change. *Nature* 427: 145–148. doi:10.1038/nature02121.

Thorn, S., Hobbs, R.J. & Valentine, L.E. 2018. Effectiveness of biodiversity offsets: An assessment of a controversial offset in Perth, Western Australia. *Biological Conservation*, 228, pp.291-300.

Tilman, D., Clark, M., Williams, D.R., Kimmel, K., Polasky, S. & Packer, C. 2017. Future threats to biodiversity and pathways to their prevention. *Nature*, 546(7656), pp.73-81.

UN (United Nations). 2007. *United Nations Millennium Development Goals Report 2007*. United Nations (UN), New York.

UN CBD (UN Convention on Biological Diversity). 2010. COP 10 decision X/2. *Strategic plan for biodiversity 2011–2020*. New York, NY: UN.

United Nations Environment Programme. 1992. *Convention on biological diversity*. Nairobi, Kenya

Urquhart, P. & Atkinson, D. 2000. *A Pathway to Sustainability – Local Agenda 21 in South Africa*, Environmental Evaluation Unit, South Africa.

van Wilgen, B.W. & Richardson, D.M. 2014. Challenges and trade-offs in the management of invasive alien trees. *Biological invasions*, 16(3), pp.721-734.

Villarroya, A., Barros, A.C. & Kiesecker J. 2014. Policy Development for Environmental Licensing and Biodiversity Offsets in Latin America. *PLoS ONE* 9(9):e107144.doi:10.1371/journal.pone.0107144

von Hase, A. 2013. Exploring the Opportunity to Pilot a Conservation Banking Scheme in the eThekweni Municipality.

Walz, U. 2011. Landscape structure, landscape metrics and biodiversity. *Living reviews in landscape research*, 5(3), pp.1-35.

Watson J, Shanahan D, Di Marco M, Allan J, Laurance W, Sanderson E, ... Venter O. 2016b. Catastrophic declines in wilderness areas undermine global environment targets. *Current Biology* 26:2929–2934.

White, T.B., Bull, J.W., Toombs, T.P. & Knight, A.T. 2021. Uncovering opportunities for effective species conservation banking requires navigating technical and practical complexities. *Conservation Science and Practice*, 3(7), p.e431.

Wilkinson, D & Birmingham, P. 2003. Using research instruments: A guide for researchers. Routledge.WWF. 2021. World Wildlife Fund.

[https://www.wwf.org.nz/what\\_we\\_do/climateaction/causes\\_of\\_climate\\_change/](https://www.wwf.org.nz/what_we_do/climateaction/causes_of_climate_change/). Accessed 27 August 2021

Wynberg, R. 2002. A decade of biodiversity conservation and use in South Africa: tracking progress from the Rio Earth Summit to the Johannesburg World Summit on Sustainable Development. *South African Journal of Science*, 98(5), pp.233-243.

Young, J., Richards, C., Fischer, A., Halada, L., Kull, T., Kuzniar, A., ... Watt, A. 2007. Conflicts between biodiversity conservation and human activities in the central and eastern European countries. *Ambio* 36:545–550

Zhong, L., & Wang, J. 2017. Evaluation on Effect of Land Consolidation on Habitat Quality Based on InVEST Model. *Trans. Chin. Soc. Agricultural Engineering* 33: 250–255

## APPENDIX

### Link to Online Questionnaire

The online questionnaire used for the study can be found on the link below:

<https://docs.google.com/forms/d/1isWSqarikoSq0Xgtx34A4tLU999u8zmVkfAdafL0Uok/edit>

## Questionnaire

# Questionnaire: Biodiversity Offsets: Investigating the perceived benefits for conservation in South Africa

Date: 17 May 2021

Dear Sir/Madam

Invitation to participate in a study on biodiversity offsets

My name is Lucas M. Tsoku and I am a student (Student number: 36942448) at the North-West University: Potchefstroom Campus studying towards a Masters Degree in Environmental Management. As part of my studies, I have to undertake a research project, and my research writing focusses on biodiversity offsets and their perceived benefits for biodiversity conservation in South Africa. This study is conducted under the supervision of Professor Dirk Cilliers (Email: [dirk.cilliers@nwu.ac.za](mailto:dirk.cilliers@nwu.ac.za) or mobile: 0845177979).

I would like to invite you to take part in a questionnaire survey. This activity will involve answering a set of questions on the link sent to you via Google Forms. The duration of your participation in answering the questionnaire may be approximately 30 minutes. Participation is voluntary and there is no penalty or loss of benefit for non-participation. There will be no costs or compensation to you for participating in this study. You may withdraw at any time or not answer any question if you do not want to. All responses will be treated anonymously.

If you have any questions during or afterwards about this research, you are welcome to contact me on the details listed below. This study will be written up as a research report which will be available online through the library website of the North-West University. If you wish to see a summary of this report, I will be happy to send it to you as soon as it is available. The data collected from this research project will be stored in the computer system with a controlled password for future secondary analysis; and it will be kept for five years. Ethical clearance was obtained for this study and my ethics number is NWU: 0 0 4 7 9 - 2 1 - A 9. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact Prof Roelof Burger at [roelof.burger@nwu.ac.za](mailto:roelof.burger@nwu.ac.za)

Yours sincerely,

Mr. Lucas M. Tsoku

Student number: 36942448

Mobile: 0729288427

E mail: [tsoku.lucas@gmail.com](mailto:tsoku.lucas@gmail.com)

Email \*

Your email

---

Gender \*

Female

Male

Prefer not to say

Other: 

---

Type of organization you are working in \*

Government

Private

Position held in the organization \*

Your answer

---

Number of years in the organization \*

Your answer

---

Number of offsets involved in \*

Your answer

---

Contact details

Your answer

---

In your opinion, what are the potential benefits of biodiversity offsets for conservation? \*

Your answer

---

In your opinion, what are the actual realized benefits of biodiversity offsets for conservation? \*

Your answer

---

In your opinion, what are the actual realized benefits of biodiversity offsets for conservation? \*

Your answer

---

In your opinion, what needs to be done to effectively bridge the gap between potential and realized benefits? \*

Your answer

---

What is your opinion on the effectiveness of biodiversity offsets projects in South Africa? \*

Your answer

---

In your opinion, what are the challenges affecting the successful implementation of biodiversity offsets projects in South Africa? \*

Your answer

---

In your opinion, what are the challenges affecting the successful implementation of biodiversity offsets projects in South Africa? \*

Your answer

In your experience, has biodiversity offsets contributed to the conservation effort in South Africa? \*

Yes

No

Following up on your answer to the question above, please elaborate and provide examples where possible. \*

Your answer

Submit

Clear form

Never submit passwords through Google Forms.

