MULTI-STAKEHOLDER MANAGEMENT OF A WETLAND IN THE CITY OF TSHWANE: THE CASE OF COLBYN

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DECLARATION

I, Kennedy Nemutamvuni of student number 49966863 hereby declare that the study on *Multi-Stakeholder Management of a Wetland in the City of Tshwane: the Case of Colbyn* is my own research work, and that all sources of information that I have used are acknowledged by means of complete references.

SIGNATURE: 

DATE: 28 August 2018

ABSTRACT

South Africa is ranked as one of the most mega-biodiverse countries in the world. But as the country faces poverty, unemployment and income inequalities, it is a mammoth task to develop, sustainably use and appreciate this natural capital. Thus, South Africa must find ways to ensure a balance between conservation of biodiversity and the achievement of socio-economic development. But when land is set aside for conservation, in most cases, local communities are on the receiving end of the decision making, with little to no opportunity to be involved. The Colbyn Valley Wetland is different, however. The site provides invaluable ecosystem goods and services to the local residents, as well as being an integral part of the Hartbeesspruit catchment and Roodeplaat dam. It has a history of sustained attempts to convert the site into housing estates, shopping centres or car parking. These attempts have met with unrelenting resistance by the local residents. Contrary to the experiences of other communities in South Africa, Colbyn Valley residents have elected to work together with other stakeholders to ensure the protection of this site. This study documents the processes that the residents undertook to protect the wetland. In this regard, local authorities can learn how to leverage stakeholder engagement to protect other sites. Importantly, the study found that the various stakeholders involved in the preservation of the Colbyn Valley Wetland were driven by different but interwoven interests. Thus, different interests need to be taken into consideration before protected areas adjacent to communities can be proclaimed. For example, the primary stakeholders - local residents who initiated the call to protect the Colbyn Valley Wetland – hold strong beliefs that the wetland must be preserved for ecosystem goods and services that it provides. Secondary stakeholders – the provincial government departments responsible for the management and protection of ecosystems – only acted when pressured by the local residents, despite their legal obligations to protect the site (as it carries so much value to the water provision of the city). The tertiary stakeholders – various voluntary institutions and people – elected to support the conservation effort due to the manner in which the local residents organised themselves and developed a vision for the site.

Keywords: Colbyn Valley Wetland, City of Tshwane, wetlands, community partnerships, stakeholders.

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ABBREVIATIONS

ARC	Agricultural Research Council
BGIS	Biodiversity Geographic Information System
BMP-E	Biodiversity Management Plans for an Ecosystem
CBA	Critical Biodiversity Area
CoGTA	Department of Co-operative Governance and Traditional Affairs
DAFF	Department of Agriculture, Forestry and Fisheries
DWAF	Department of Water Affairs and Forestry (Now Department of Water and Sanitation)
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EMP	Environmental Management Programme
FAO	Food and Agriculture Organisation
FoCV	Friends of Colbyn Valley
GDARD	Gauteng Department of Agriculture and Rural Development
IUCN	International Union for the Conservation of Nature
NFEPA	National Freshwater Ecosystem Priority Areas
SACN	South African Cities Network
SANBI	South African National Biodiversity Institute

CHAPTER 1: INTRODUCTION

1.1 Introduction

Middleton, Goldblatt, Jakoet & Palmer (2011) note that with so many socio-economic responsibilities and legal and political obligations, municipalities have difficulties in protecting and maintaining their ecological infrastructure. Ecological infrastructure such as healthy mountain and river catchments, wetlands, marine and coastal dunes, is defined here as functional and pristine ecosystems that deliver services to all life on earth (SANBI, 2014). In particular, in South Africa, local governments often bear the brunt of community service delivery protests, despite not being solely responsible for providing certain services (as all spheres of government have service delivery responsibilities) (CoGTA, 2009; The Water and Sanitation Program, 2011; Stats SA, 2016). Service delivery protests render the built infrastructure managed by local municipalities vulnerable to destruction (StatsSA, 2016). Such protests unfortunately also force local governments to make short-term decisions that often take money away from investment in critical ecological infrastructure (CoGTA, 2009).

Additionally, ecological infrastructure is vulnerable to degradation or destruction as other land uses compete with it for physical space (SANBI, 2014). An example of this is the building of informal houses on the banks of the Jukskei River which flows through Alexandra Township in Gauteng. One of the areas that require immediate attention is assisting local communities to recognise the value of ecological infrastructure. To do this requires local government to build good working relationships with local residents, so as to improve the attitudes of communities towards such resources (Taylor & Atkinson, 2012). This can diminish negative perceptions that communities have regarding ecological infrastructure (Bennett & Dearden, 2014).

The case of Colbyn Valley Wetland in the City of Tshwane brings another perspective to the ecological infrastructure issue. This wetland-dominated nature reserve is viewed by many as a potential site for alternative land uses that could create both job and income opportunities, new human settlements and even agriculture. But, in this case, local residents adjacent to the wetland – working under the banner of 'Friends of Colbyn Valley (FoCV)' – formed a collaborative partnership to protect this site from development. The 'FoCV' is a voluntary association of local residents who wish to protect the wetland. They share the same views, interests and commitment to the preservation of the Colbyn Valley Wetland and none stand to make any personal gain from their participation in the association. The partnership has

launched a number of conservation related activities recognised by the National Environmental Management: Protected Areas Act [Act 57 of 2003] (hereafter referred to as the Protected Areas Act) in the nature reserve. These include environmental education programmes, clean-ups, academic research undertakings, avitourism and other initiatives that support sustainable livelihoods and the empowerment of local residents. The FoCV group work together with other stakeholders to bring about sustainable management of this piece of ecological infrastructure. One of the positive spin-offs for local government is a reduced financial burden of care for the site.

1.2 Problem statement

Worldwide it is uncommon for ecological infrastructure to enjoy the support of surrounding communities (Bennett, & Dearden, 2014). Rather, Bennett and Dearden (2014) record many cases of ecological infrastructure being declared a protected area with only minimal support or even strong hostility from neighbouring communities, to the extent of even undermining the stance of local authorities regarding such infrastructure. In some cases local people often access nature reserves illegally, exploiting the protected natural resources or disturbing the entire ecosystem. This is not the case with the Colbyn Valley Wetland, where local residents value the site's biodiversity, peatland and wetland. These local residents have ensured the wetland is protected and they have stopped alternative land uses from gaining a foothold. This unusual behaviour by local residents has triggered a need to understand their motives and interest towards this site. In particular, the establishment of the Colbyn Valley Wetland as a nature reserve in 2014 (Figure 1.1) provides evidence that with a better understanding of the value or benefits derived from healthy ecosystems, and a respect for communities by authorities, it is possible to have an alternative outcome to those presented by Bennett and Dearden (2014).

126 No. 166 PROVINCIAL GAZETTE, 25 JUNE 2014

NOTICE 1972 OF 2014

DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT
NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT NO. 57 OF 2003)
DECLARATION OF AN AREA AS THE COLBYN WETLAND NATURE RESERVE

I, Nandi Mayathula-Khoza, the Member of the Executive Council (MEC) responsible for Agriculture and Rural Development in the Gauteng Province, hereby declare under section 23(1)(a)(i) of the National Environmental Management: Protected Areas Act, 2003 (No 57 of 2003), the area as described in Schedule A, as a nature reserve. The boundary of the nature reserve is reflected on the Diagram as set out in Schedule B, and I assign the name "Colbyn Wetland Nature Reserve" to it.

NANDI MAYATHULA-KHOZA
MEMBER OF THE EXECUTIVE COUNCIL
GAUTENG AGRICULTURE AND RURAL DEVELOPMENT

SCHEDULE A

PROPERTY DESCRIPTION (TITLE DEEDS)
The Farm Koedoespoort 325/456-JR: Portion 57 in the extent of 4.778 hectares, held by Title Deed No. T19453/1952
The Farm Koedoespoort 325/456-JR: Remainder of Portion R6 in the extent of 55.958 hectares, held by Title Deed No. T20101/1989

SCHEDULE B

PROPERTY DESCRIPTION (BOUNDARY DELINEATION)

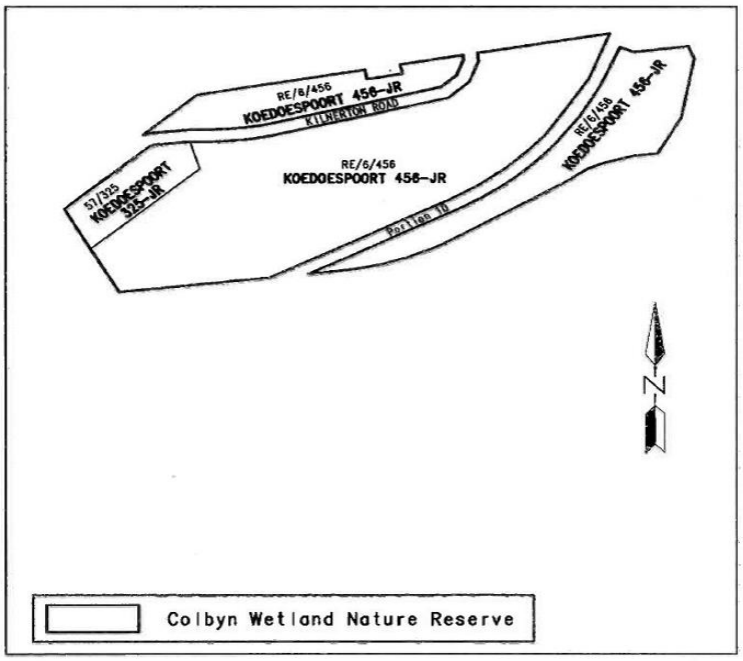


Figure 1.1: Notice of declaration of Colbyn Valley Wetland (Source: Gauteng Provincial Gazette No. 126, 2014).

In addition, protection of the wetland was a result of collaboration across different spheres of government. This wetland falls within the jurisdiction of local government through the City of Tshwane, but the powers to declare it a nature reserve reside with the responsible Member of the Executive Council (MEC) for the Gauteng Department of Agriculture and Rural Development (GDARD). In this regard, the provincial minister has to work closely with the National Minister of Environmental Affairs in terms of the Protected Areas Act. However, as

part of the co-operative governance system in South Africa, the local authority or municipal council must give a vote of approval to any proposed declaration. This also makes the declaration of the Colbyn Valley Wetland unusual, as all three spheres of the South African state managed to work together, contrary to many other instances by local and international (Bennett & Dearden, 2014).

Lastly, local residents and the three spheres of government were not alone protecting this piece of ecological infrastructure. They were also supported by stakeholders from different sectors of society, namely non-government organisations, academic institutions and businesses (Figure 1.2). Because of this, the study categorised these stakeholders into three groups, namely:

- Primary stakeholders – the local residents;
- Secondary stakeholders – largely institutions with legal obligations to look after the wetlands. This included the City of Tshwane, GDARD, the Department of Environmental Affairs (DEA) and the Department of Water and Sanitation (DWS);
- Tertiary stakeholders – institutions that have an interest in the protection of the Colbyn Valley Wetland specifically. They included the Centre for Wetland Research and Training, the Agricultural Research Council (ARC), the International Council for Local Environmental Initiatives (ICLEI), the Water Research Commission and many others.

Stakeholders, depending on their background, are usually driven by selective interests (Ansong & Røskaft, 2011). This study then sought to detail the interests of each set of stakeholders and how they related to the overall purpose of protecting the Colbyn Valley Wetland. This included how relationships amongst these stakeholders were managed.

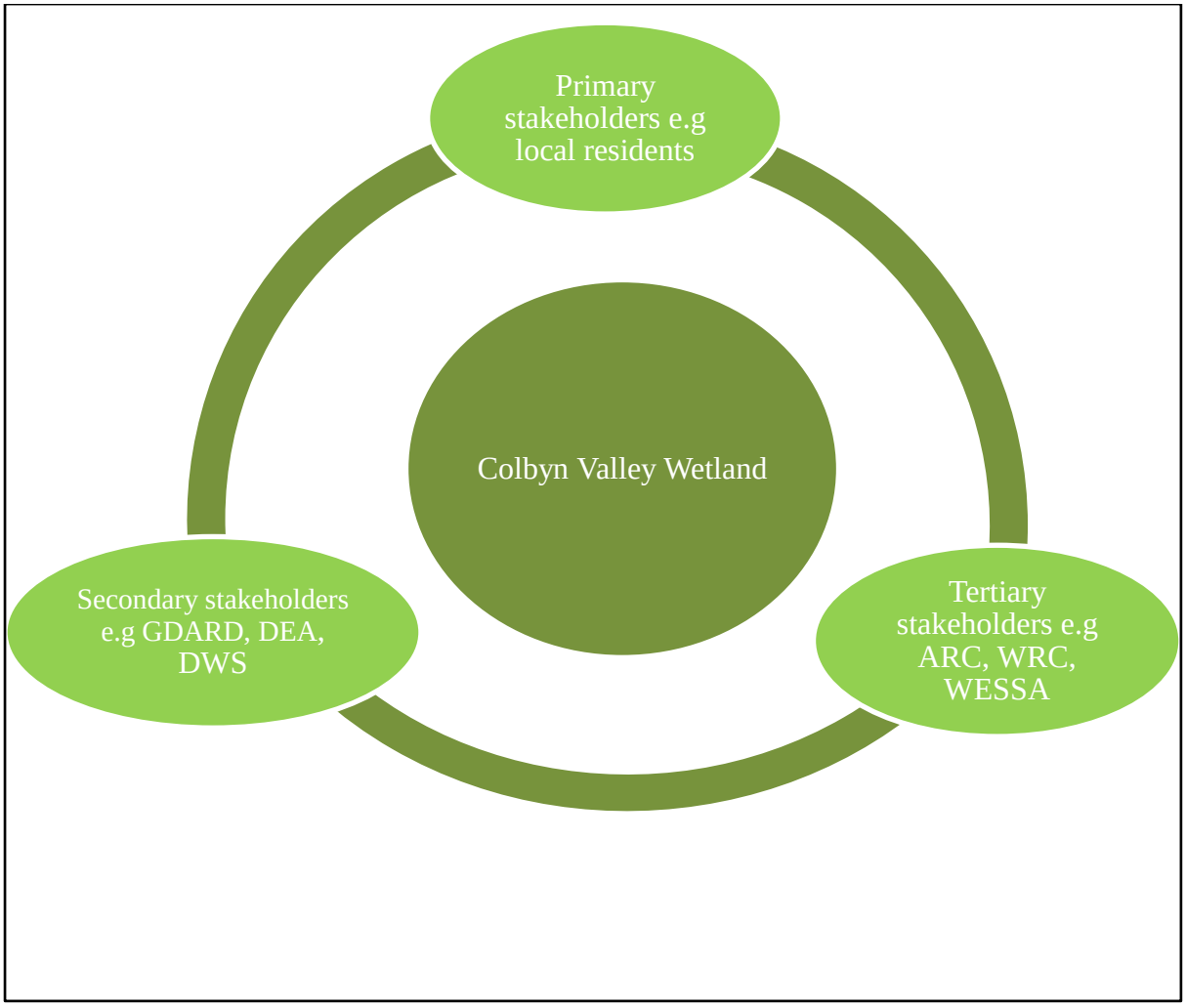


Figure 1.2: Stakeholders involved in the Colbyn Valley Wetland (Source: Author, 2017).

1.3 Rationale/justification for the study

Wetland ecosystems are the most threatened ecosystems in South Africa. A substantial number of wetland ecosystems have already reached a Critically Endangered state, with very little of the original extent in the natural or near-natural area left, a situation worsened by the lack of historical mapping of wetlands (Driver, Sink, Nel, Holness, Van Niekerk, Daniels, Jonas, Majiedt, Harris & Maze, 2012). Poor mapping of wetlands is one of the many factors that make it difficult to protect wetlands in South Africa. For example, in the City of Tshwane, only 35 wetlands are listed in the National Freshwater Ecosystem Priority Areas (NFEPA) records (City of Tshwane, 2014). This additionally, makes the Colbyn Valley Wetland even more unique as it was one of the sites that were never mapped, but is protected. This protection was achieved despite pressures from alternative land uses (such as 'park-and-ride' facilities, property development, a shopping mall, housing and the like). Documenting

the process of achieving protection of this wetland can then serve as a roadmap for other communities who may also want to protect their ecological infrastructure from such pressures in the future.

1.4 Aims and objectives

The main aim of this study was to examine the factors that led to the multiple stakeholders working together to protect the Colbyn Valley Wetland. The study sought to provide insight into how stakeholders – working together – made it possible to secure this critical biodiversity area in the face of competing land uses. The commitment of these stakeholders both before and after the wetland was declared a nature reserve was assessed. The study also explored the effectiveness of the governance system used by the stakeholders in the Colbyn Valley Wetland, and the motives of each stakeholder group involved in governance. Investigations were made into the impact these stakeholders have had on the Colbyn Valley Wetland and its existence over time. Finally, the study aimed to share valuable lessons that could be used in other areas.

1.5 Research questions

The following questions guided this study:

Question 1: What are the key factors attracting stakeholders to the wetland?

Question 2: What is the role of each stakeholder in the protection of the Colbyn Valley Wetland?

Question 3: What is enabling this partnership of stakeholders in the protection of the wetland?

Question 4: Are there any returns on investment for these stakeholders?

Question 5: What transferable lessons can be learnt from Colbyn Valley Wetland Nature Reserve and its stakeholders?

1.6 Research design and methodology overview

According to Zainal (2007) case studies allow researchers to interact with the identified problem, target participants and sources of data. However, it is important that case studies be procedural with a set of steps guiding the process of investigation (Zucker, 2009). This case study used two sets of questionnaires that were shared with all the stakeholders, namely the

primary, secondary and tertiary stakeholders. The primary stakeholders received a closed-ended questionnaire (see Appendix 1) which was informed by the aim of the study, which investigated the history of local community activism towards the wetlands and the importance of securing the site as a nature reserve. This was followed by a semi-structured questionnaire (see Appendix 2) sent to the secondary and tertiary stakeholders, also informed by the study aims, but also looked at other options for use of the site given other competing land uses, institutional interests and the return on investment. Thus, the study adopted the mixed-research method due to its ability to integrate both descriptive data and statistical inputs from the close-ended and semi structured questionnaires (Mouton, 2013).

The primary stakeholders (the local residents) were interviewed individually as members of the FoCV (which was an administrative vehicle of their collective demands). Secondary stakeholders (authority-bearing government institutions with responsibility to secure important biodiversity) were only represented by the Gauteng Department of Agriculture and Rural Development which is the immediate authority responsible for the protection of the site. Tertiary stakeholders (influence-bearing institutions such as non-government organisations, research and academic institutions) were represented by the Agricultural Research Council, which was involved in the wetland before the protection and continues to be involved in the activities in the wetland.

1.7 Conclusion

This chapter introduced an urban wetland that faced pressure to be destroyed by a change in land use into infrastructure development, housing or estate development, but survived. This wetland had a number of stakeholders who defended it in the face of significant pressure. The roles of each stakeholder were not the same, hence the classification of them as primary, secondary and tertiary, but together they ensured the site was secured as a nature reserve. The chapter also introduced the research questions that helped explain how the wetlands survived under such threats. The answers to these questions were sought through a questionnaire, guided by the objectives of the study, which allowed participants to share their stories. The chapter also explained the choice of the research methods which was based on the descriptive and statistical data that was collected about the site.

1.8 Chapter overview

This section provides a brief summary of the key content issues that each chapter is focused on.

Chapter 1: Introduction

This chapter introduces the Colbyn Valley Wetlands, which is an important site of ecological infrastructure situated on prime land in the eastern side of Pretoria. This wetland survived various intents to convert it into other uses, driven by profit or other infrastructure developmental needs. This survival was a result of the collective fight by stakeholders who ensured that nothing happened on the wetland but formal protection. This chapter also introduced the research questions that were informed by the overall objectives of the case study.

Chapter 2: Description of the study area

This chapter provides a detailed description of the significance of the Colbyn Valley Wetland in broad terms. This includes the significance of the wetland to the municipality and its people, the ecosystems goods and services that the wetland generates, and the role that it has in climate change adaptation and response. This includes the relationship of the wetland with other landscape features such as its underlying geological structure.

Chapter 3: Literature review

This chapter has looks into the literature about wetland ecosystems, including their biodiversity in general and their protection, particularly in the urban context. This includes using practical case studies to understand the threats and pressures that these ecosystems regularly face. Also shared are some of the successful stories of securing wetland ecosystems, and other cases of how it never worked. The chapter also reviews the international and domestic legal framework that enables wetland protection in the urban context.

Chapter 4: Research design and methodology

For the study to achieve its objectives, a mixed research method was adopted. This method was based on the questionnaires which were shared with all stakeholder groups. The questionnaire was split into two, namely a closed-ended questionnaire, which was sent to primary stakeholders, followed by a semi-structured questionnaire sent to secondary and

tertiary stakeholders. The research questions and objectives of the case study informed the design of each of these questionnaires. The primary stakeholders were local residents who participated individually, while secondary and tertiary stakeholders were representatives of institutions that were involved before and after protection. The questionnaires were used to extract both descriptive and statistical data from the participants.

Chapter 5: Results

The data collected from the questionnaire is presented in this chapter. This is the data that informs the discussions and conclusion of the case study.

Chapter 6: Discussion

The data was then contextualised through analysis which enabled extraction of the key findings of the study. This was then used to answer the research questions and explain how the study it met its objectives.

Chapter 7: Conclusion and recommendations

The study is then concluded with a summary of the findings, pointing to areas of success and lessons that could be taken forward.

CHAPTER 2: DESCRIPTION OF THE STUDY AREA

2.1 Introduction

This chapter presents comprehensive details of the Colbyn Valley Wetland in terms of location, biophysical factors, the diversity of ecosystems and species. It highlights factors that led to the establishment of the Colbyn Valley Wetland as a nature reserve. The people that surround the area and their socio-economic status are also described.

2.2 Background and history

The Colbyn Valley Nature Reserve is generally classified as a "nature area" in terms of the City of Tshwane by-laws on land use management. The term "nature area" is a shortened version of "Nature Conservation Area" that the City of Tshwane uses to classify areas set aside for conservation purposes. These areas currently include any of the following:

- Natural open spaces
- Nature conservation worthy areas
- Nature reserves
- Protected natural areas

A nature area can be wholly managed, under curatorship, leased or controlled by the municipality with open access to the members of the public. In terms of the City's by-laws on land management, the municipality is at liberty to determine the conditions of access.

According to Sherwill (2015), the Colbyn Valley Wetland was initially deemed agricultural land and first mapped in 1859 as part of a farm belonging to Cornelius Bronkhorst, who later sold it to the Methodist missionary church. Thereafter the land was given to the University of Pretoria to be used for agricultural research purposes. Subsequently, the university gave the plot to the Pretoria City Council, which then classified the land as a natural open space. Unfortunately, by this time the wetland was severely degraded. The peatland had dried out due to drainage for irrigation purposes and the digging of agriculture trenches. In the 1970s a new block of apartments was built in on the edge of the wetland, a process that resulted in erosion and stream alterations, amongst other damages (Sherwill, 2015).

In the early 1990s, the Pretoria City Council announced that it wanted to convert the Colbyn Valley Wetland into a golf course. Local residents were incensed and formed the 'Friends of Colbyn' pressure group to oppose to the golf course development. Subsequently, a group of

children from CR Swart High School launched a project to rehabilitate the wetland sponsored by the National Development Trust (NDT). Initially, the NDT supported the rehabilitation project as it was thought that the wetland had some peat moss. Later, a wetland specialist, Dr Piet-Louis Grundling, found that the area was home to a 7000-year-old peatland (rather than peat moss) along the Hartbeesspruit. Unfortunately, the peatland was severely degraded.

Together the 'Friends of Colbyn' and the learners from CR Swart became two important lobby groups who consistently called for the protection and rehabilitation of the wetland. For example, in late 1999, a pipeline was installed in the nature reserve without the due environmental impact assessments process being followed. The lobby group managed to force the City Council to rehabilitate the section that the pipeline had impacted upon. Spurred on by their success, the lobby group then pressurised Metro Rail to conduct a formal assessment on the erosion of the wetland located near the railway line that ran through it. The findings of the report were then implemented with the building of gabions and other rehabilitation measures aimed at removing alien species of plants and grasses. The City of Tshwane Nature Conservation Department later fenced off the whole site to prevent unauthorised access. All these actions improved the state of the wetland. The wetland also received further support in 2002 from the Working for Wetlands Programme which built gabions to channel the stream flow and stabilise banks and soil structure (Sherwill, 2015). The, for about a decade, the Friends of Colbyn became inactive. Only in 2012 was the group resuscitated in the form of 'FoCV', although there are no formal records of how this process was took place.

It was the FoCV who oversaw the declaration of the wetland as nature reserve on the 25th of June 2014. The proclamation was made in terms of the Protected Areas Act (Provincial Gazette No. 166, 2014). The Gauteng MEC for GDARD has facilitated the declaration, but daily management of the nature reserve was assigned to the City of Tshwane (Sherwill, 2000).

2.3 Location of the wetland

The site is located approximately five kilometres to the east of the Pretoria Central Business District surrounded by various suburbs (see Figure 2.1). This wetland currently encompasses 60 hectares of which one percent is covered by peatland. The site has an altitude of between 1320 and 1335 m above mean sea level, with location co-ordinates of 25.83 S and 28.26 E (Grundling & Marnewick, 2000). The Colbyn Valley Wetland has boundaries that stretch

along Kilnerton Road to the north-west, Wilkinson Street to the north, along Stanza Bopape to the south-east, Colbyn Golf Park to the south and the N1/N4 interchange to the east (DEA, 2016).

The Colbyn Valley Wetland is formally recognised within the City of Tshwane regionalisation model. The regionalisation model divides the city into seven regions for service delivery and communication purposes (City of Tshwane, 2013b). Within each region there are political wards that are represented by Councillors in the City Council. The Colbyn Valley Wetland is located in Ward 82 of Region Three. The City of Tshwane has classified the Colbyn Valley Wetland as a nature area in terms of land-use (City of Tshwane, 2014). This land-use classification enables the City of Tshwane to determine how the plot of land will be used and the type of needs required to ensure the land is utilised efficiently. However, the Colbyn Valley Wetland still faces pressures from built infrastructure such as road networks and settlement expansion, as well as industrial development (Van Staden, de Klerk, & Mileson (2013).

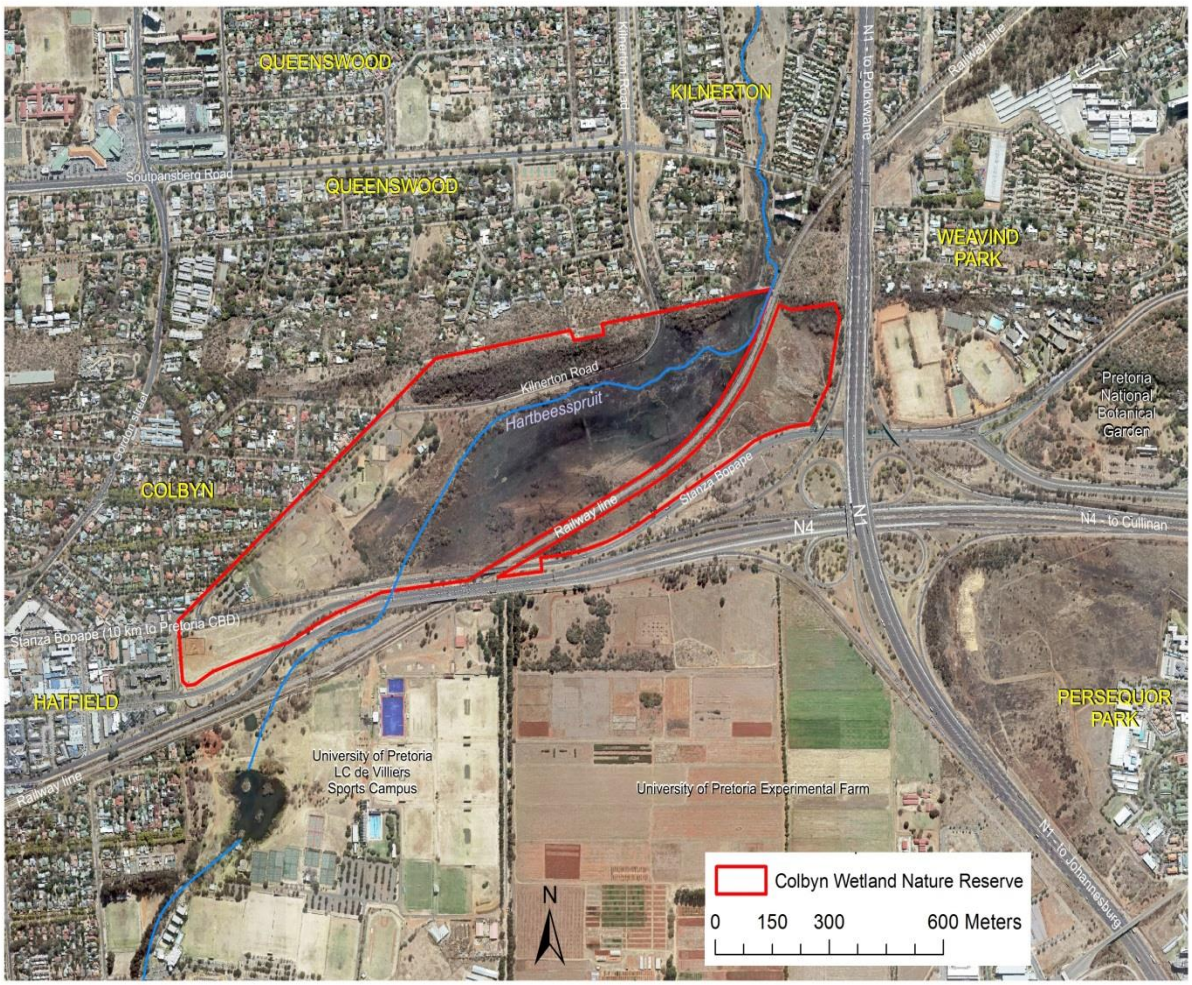


Figure 2.1: Location of the Colbyn Valley Wetland (Source: SANBI: BGIS, 2017)

2.3 Colbyn Valley Wetland is within the Marikana Thornveld vegetation type

The Colbyn Valley Wetland is found in the transition area (an ecotone) between bushveld (Magalies Mountain) and grasslands (Figure 2.14). It is dominated by a wetland with peat and contains a diversity of fauna and flora. The wetland falls within the Marikana Thornveld vegetation type (Figure 2.2), listed as vulnerable in terms of the National List of Threatened Terrestrial Ecosystems published by the Government Gazette Notice Number 34809 of 2011 (Van Staden *et al*., 2013). Van Staden *et al.* (2013) state that this vegetation type is spread across Gauteng and North West provinces within an altitude of 1000 – 1500 m above sea level.

The original extent of the Marikana Thornveld in Gauteng was 101 699 hectares (SANBI, 2013). Currently, only 4% of the vegetation had been formally protected, while almost 60% has been lost, and the 39% remaining areas are vulnerable (Figure 2.3) (SANBI, 2013). Thus,

this type of vegetation is classified as a 'very poorly protected' in terms of the protection status of vegetation types in Gauteng Province (SANBI, 2013).

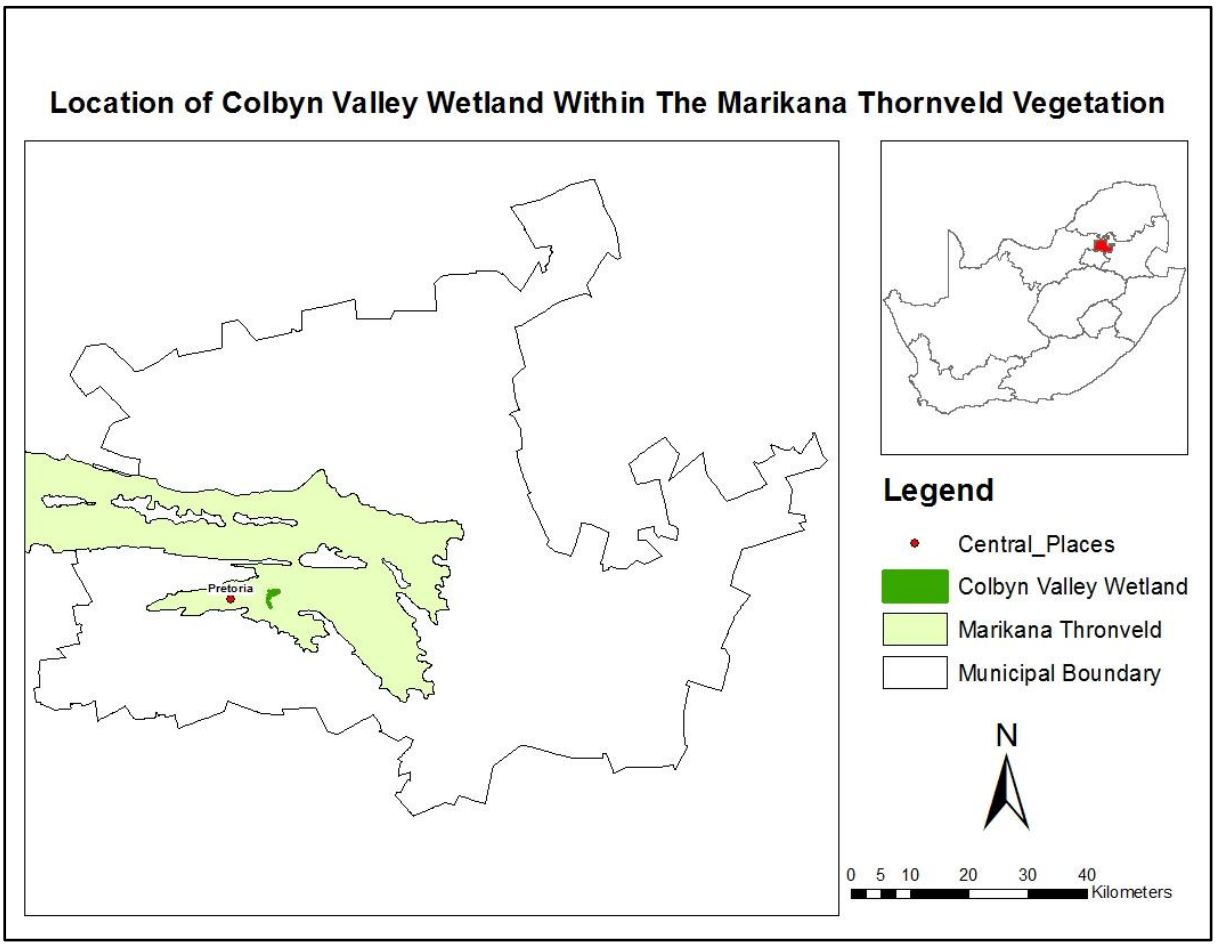


Figure 2.2: Colbyn Valley Wetland in Marikana Thornveld (Source: Author, 2017)

In the financial year 2012/2013, the Gauteng province had set a 5-year target for protecting the Marikana Thornveld vegetation at a rate of 2 524 hectares per annum (GDARD & SANBI, 2013). At the beginning of this target, the province had only 4 752 hectares of this vegetation type formally protected. This means the protection of the Colbyn Valley Wetland (at 60 hectares), has added value not only to the protection of the wetland but also to the protection of the broader vegetation type.

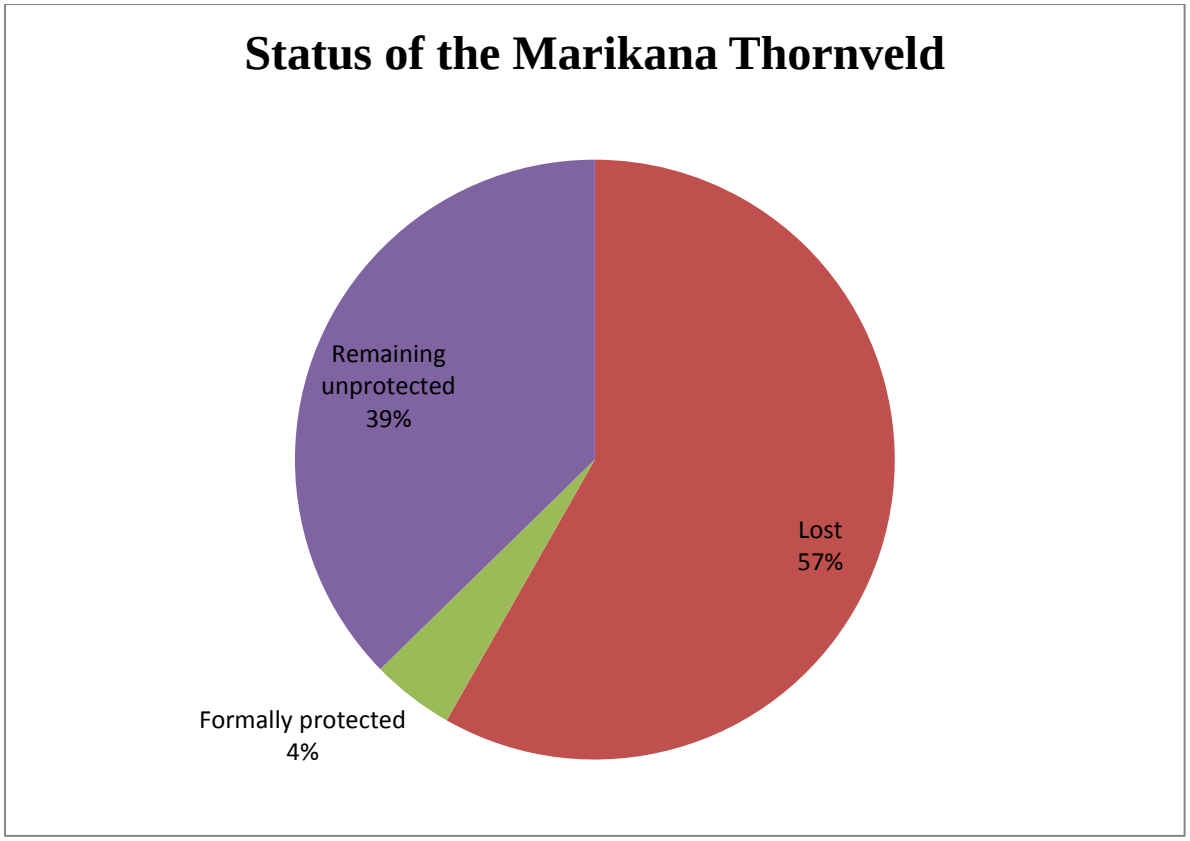


Figure 2.3: The current status of the Marikana Thornveld vegetation as a percentage of initial size (Source: GDARD & SANBI, 2013, p. 23).

2.4 Fauna and flora found in Colbyn Valley Wetland

This section introduces the flora and fauna found in Colbyn Valley Wetland which is associated with the Marikana Thornveld vegetation. It is acknowledged that although efforts were made to acquire a comprehensive list of all species of fauna and flora found in the nature reserve, only a selection of relevant indicator species is presented here, given the focus of this study. The floral indicator species include both grasses and woody species, as the Colbyn Valley Wetland is located in the transition area between the bushveld and grassland biomes. The faunal species focused on are selected vertebrates and invertebrate species.

2.4.1 Floral species: grass

i. *Themeda triandra,* common name Red Grass

The Colbyn Valley Wetland has wide spread of *Themeda triandra* (Figure 2.4) which is a key indicator species for Marikana Thornveld. This is a grass species characterised by spikelet, bracts and hairs that often appear with camouflage colours such as red, brown, blue and yellow (Fish, Mashau, Moeha & Nembudani, 2015). According to Fish *et al.* (2015) this grass is perennial with variances in the location, altitude and the soil nutrients, amongst others. It has an average height of between 0.5 to 1.5 m. The species' blossoming season in southern Africa is late spring (Snyman, Ingram & Kirkman, 2013). It is one of the preferred grazing species for livestock in South Africa and it is common in the grassland and savanna biomes. The species is also used for roof thatching due to its thickness and resistance to water when dry. The species is used by ecologists as one of the indicators for good veld, since it prefers clay soil rich with nutrients. The species is very resistant to fire and will survive the continued burning of a site.

Figure 2.4: *Themeda triandra* inside the Colbyn Valley Wetland site (Source: Author, 2017).

ii. *Setaria lindenbergiana,* common name Koppie Grass

The Colbyn Valley Wetland also has *Setaria lindenbergiana*. This is a grass species that grows in the rocky ridges or under the tall trees. It is characterised by a paired spikelet with sheaths and bristles. The grass is perennial with a growing height of between 300 to 1 200 mm. It is able to survive in harsh drought conditions; however, it struggles when exposed to frost. Its preferred growing season is the summer and flowers from beginning of spring until the late summer (Fish, 2004).

iii. *Aristida congesta,* common name Cat's-tail or Three-awned Grass

According to Fish (2004) this grass species is also of perennial nature characterised by awns, spikelet, lemma and panicles. The growth height is about 10 to 75 cm. Its altitude range is between 900 and 2 900 m above mean sea level. It grows in stony ground and has low palatability for livestock. The species is also very common in the grasslands biome.

iv. *Cynodon dactylon,* common name Couch Grass

This is a very common grass species across the world (Fish *et al.,* 2015). It is also a perennial species characterised by flat leaves with sharp apex (Huang, Cho, Haryono & Kuo, 2017). Huang *et al.* (2017) found this grass species blooms from the beginning of winter to summer. It is a preferred grazing grass for many herbivore species which results in it spreading into new habitat. For this reason, it is generally included in the category of weed.

2.4.2 Floral species: woody

i. *Senegalia caffra,* common name Common Hook-Thorn

The Common Hook-Thorn is deciduous, characterised by soft foliage with bright green leaves enjoyed by livestock. The species grow up to about 14 meters tall (Kyalangalilwa, Boatwright, Daru, Maurin & Van Der Bank, 2013). *Senegalia caffra* is also a fire-resistant plant found mostly in the grasslands and savanna biomes (Kyalangalilwa *et al.,* 2013) (Figure 2.5). It is also a species to avoid near built up areas, is due to its strong and spreading root system.

Figure 2.5: *Senegalia caffra* inside of Colbyn Valley Wetland (Source: Author, 2017).

ii. *Celtis africana,* common name White Stinkwood

This is an easy growing plant species that adapts to varying environmental conditions, which provides good shade for extreme hot weather conditions. It can grow up to 25 m depending on the landscape and the management of its habitat. It is characterised by a light grey bark with spreading branches. It also has light green leaves, with its favourable blossoming season being spring (Mbambezeli & Notten, 2008).

iii. *Searsia pyroides*, common name Common Wild Currant

This is a hard stem tree characterised by bark and leaves with sharp apex. The species was selected as the South African 2007 plant 'species of the year'. It has spread widely in South Africa and across the neighbouring states. It is regarded as pioneer species after surface colonisation (Mbambezeli, 2008).

iv. *Combretum erythrophyllum,* common name River Bushwillow

Colbyn Valley Wetland also has *Combretum erythrophyllum,* which is a deciduous plant, characterised by hard bark. The species flowering season is spring in South Africa. The plant

is not selective to an altitude across South Africa but forms good linear vegetation along rivers (Le Roux, 2003).

There are many other woody species that can be observed at Colbyn Valley Wetland (Table 2.1). The other notable woody plant species in the area include the Bushman's Grape, Wild Elder and the Cape Gardenia.

Table 2.1: Other indicator-floral species of Marikana Thornveld (Source: Gauteng Provincial Gazette number 166, 2014).

Scientific name	**Common name**	**Floral order**
Paspalum dilatatum	Common Paspalum	Grass
Brachiaria serrate	Velvet Signal Grass	Grass
Elionurus muticus	Wire Grass	Grass
Eulalia villosa	Golden Velvet Grass	Grass
Setaria lindenbergiana	Mountain Bristle Grass	Grass
Nuxia congesta	Common Wild Elder	Woody
Rhoicissus tridentata	Bushman's Grape	Woody
Rothmannia capensis thunb	Cape Gardenia	Woody
Englerophytum magalismontanum	Transvaal Milkplum	Woody
Grewia occidentalis	Cross-berry	Woody

2.4.3 Faunal Species

The Colbyn Valley Wetland hosts a variety of animal species that range from tiny insects to large vertebrates, such as buck. Many of these species use the wetland and its vegetation as habitat as well as a source of food. They also include bird species, as well as worms that are part of the wetland community.

i. *Bubo africanus,* common name Spotted Eagle-Owl

The Spotted Eagle-Owl is a familiar bird in many parts of southern Africa and lives in a wide range of habitats. It has an extremely varied diet, eating anything from poisonous snakes and carrion, to falcons and insects. It breeds in most months in the year, nesting in a variety of different places. There are usually 2-3 chicks in one brood, up to 6 chicks in good years. Juveniles are only fully independent 4 months after leaving the nest (BirdLife International, 2016).

ii. *Asio capensis,* common name Marsh owl

This bird species finds its habitat in grasslands, particularly of southern Africa. It is diurnal with its preferred prey being small insects, worms and other variety of small vertebrates. It buries its eggs under dense grasses and reeds, making difficult for the predator to prey on its eggs (Figure 2.6). Depending on the location, this bird lays eggs of between two and six that are subjected to incubation for up to 28 days. The male gathers food for the female and the chicks until the chicks have grown into adults, which takes 18 days (BirdLife International, 2016).

Figure 2.6: Examples of the reeds that *Asio capensisuses use* to hide eggs (Source: Author, 2017).

iii. *Ploceus velatus*, common name Southern Masked-Weaver

The Colbyn Valley Wetland also hosts a non-threatened bird species, namely the *Ploceus velatus.* This species has adapted to various South African habitats including those with alien plant species such as *Eucalyptus grandis*, which they also use as their preferred tree to host their nests. The species occurs in southern Africa, particularly in shrublands, savanna or woodlands (BirdLife International, 2017). It feeds on variety of plant species, fruits as well as small insects. It usually lays 2-4 eggs and has a nest that is built solely by the male (Figure 2.7).

Figure 2.7: The eggs laid by the *Ploceus velatus* at Colbyn Valley Wetland (Source: Author, 2017).

The Colbyn Valley Wetland has a number of other faunal species which are indicators for the Marikana Thornveld (Table 2.2).

Table 2.2: Other faunal indicator-species of Marikana Thornveld (Source: GDARD: 2014).

Scientific name	Common name	Faunal order
Crocidura cyanea	Reddish-grey musk shrew	Mole or Eulipotyphla
Galago senegalensis	Lesser bushbaby	Primate
Saccostomus campestris	Pouched mouse	Rodentia
Ichneumia albicauda	White-tailed mongoose	Rodentia
Suncus lixus	Greater dwarf shrew	Mole or Eulipotyphla
Otomys irroratus	Vlei rat	Rodentia
Aethomys namaquensis	Namaqua rock mouse	Rodentia
Mus minutoides	Pygmy mouse	Rodentia
Cryptomys hottentotus	Common molerat	Rodentia
Thryonomys gregorianus	Lesser rietrot	Rodentia
Hystrix africaeaustralis	Cape porcupine	Rodentia
Pronolagus rupestris	Red rock rabbit	Rabbit or Lagomorpha
Galerella sanguinea	Slender mongoose	Mongose or Carnivora
Atelerix frontalis	South African Hedgehog	Mole or Eulipotyphla
Genetta genetta	Small spotted genet	Carnivora

2.5 Colbyn Valley Wetland is within the Critical Biodiversity Area network

The Colbyn Valley Wetland is located within a Critical Biodiversity Area (CBA) (Figure 2.8). Critical Biodiversity Areas are a set of important biodiversity sites and ecological

support areas required to meet the target for the protection of individual ecosystems, species and to maintain the functionality and connectivity of ecosystems (SANBI, 2017). SANBI (2017) further states that the concept of biodiversity targets comes from the intention to protect a representative sample for each ecosystem type, to safeguard the diversity of species that exist in it.

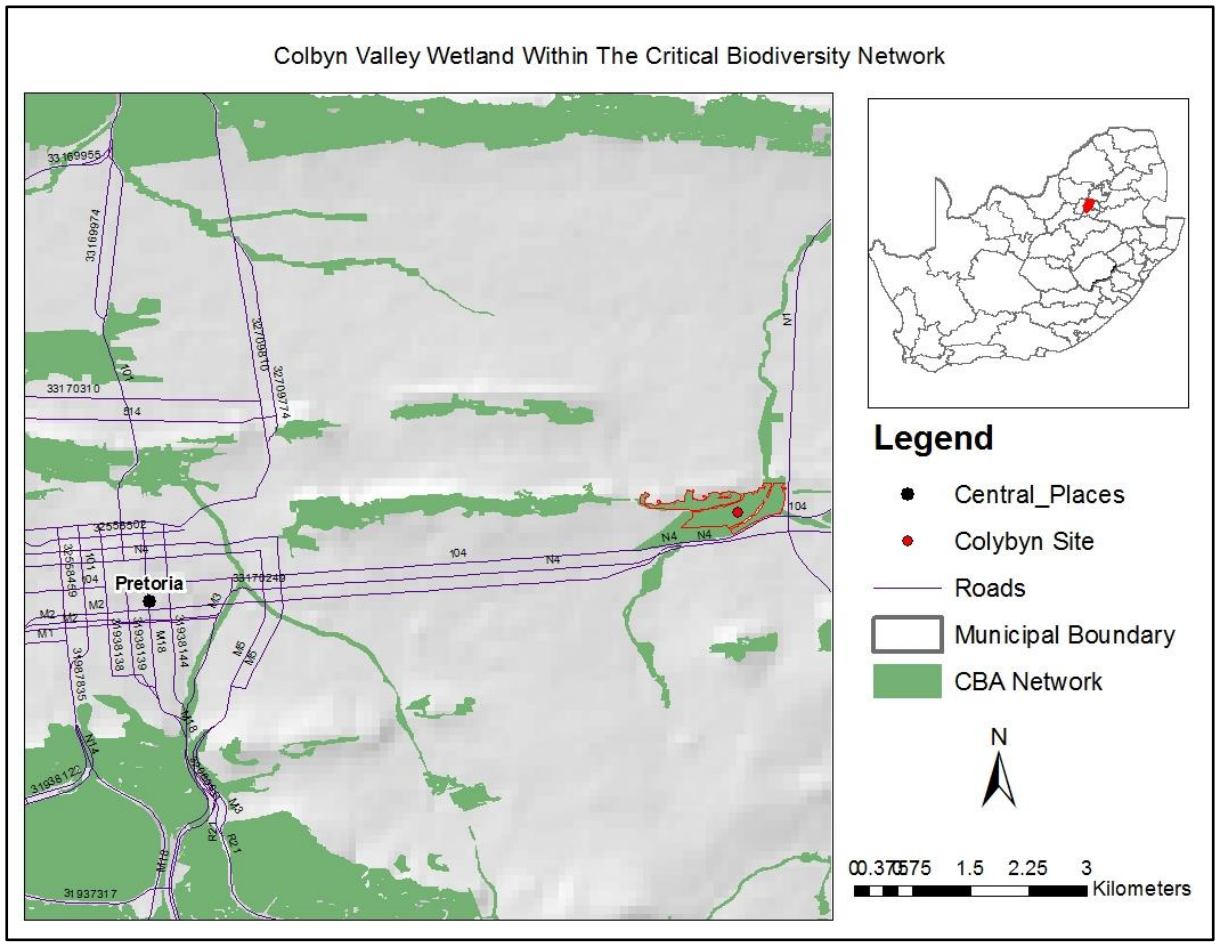


Figure 2.8: Colbyn Valley Wetland within the Critical Biodiversity Area network (Source: Author, 2017).

2.6 Wetland ecosystem type preserved at Colbyn Nature Reserve

The Colbyn Valley Wetland is classified as a valley bottom wetland. There are two subtypes of valley bottom wetlands, namely channelled and unchannelled valley bottom wetlands (Ollis, Snaddon, Job & Mbona, 2013). A wetland qualifies to be a channelled valley-bottom if it has a valley floor and a stream cutting across the wetland but without a flood plain (Figure 2.9). An unchannelled valley-bottom is a wetland that does not have any form of stream cutting across it, but it is found within a valley (Figure 2.10) (Ollis *et al.*, 2013). They

are characterised by the valley flow, lack of visible stream and the dominance of un-channelled stream flows.

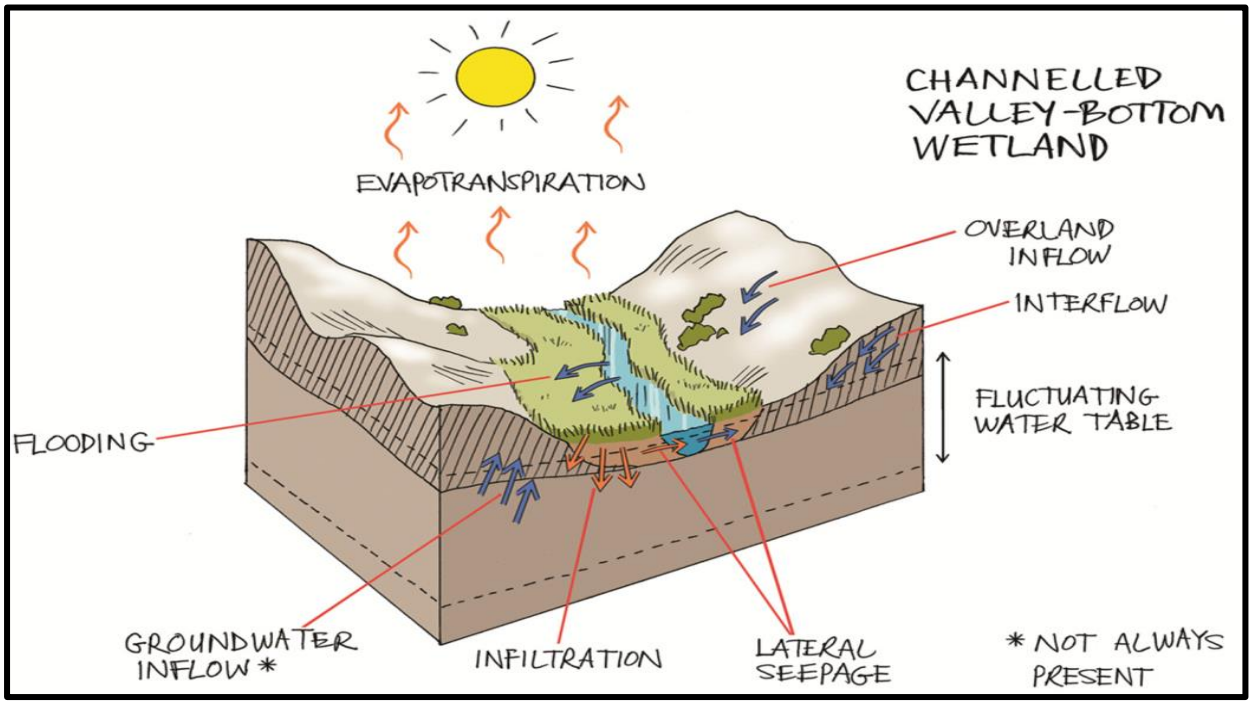


Figure 2. 9: Diagram of a channelled valley-bottom (Source: Ollis *et al.*, 2013, p. 19)

The Colbyn Valley Wetland has the Hartbeesspruit cutting across it, through to the Roodeplaat dam. The stream is easily identifiable on satellite imagery and can be traced with the linear riparian vegetation. This wetland is characterised by sediment deposited with accumulation of a peatland. Unlike the other types of wetlands, the valley bottom is never influenced by the process of erosion (Ollis *et al.*, 2013).

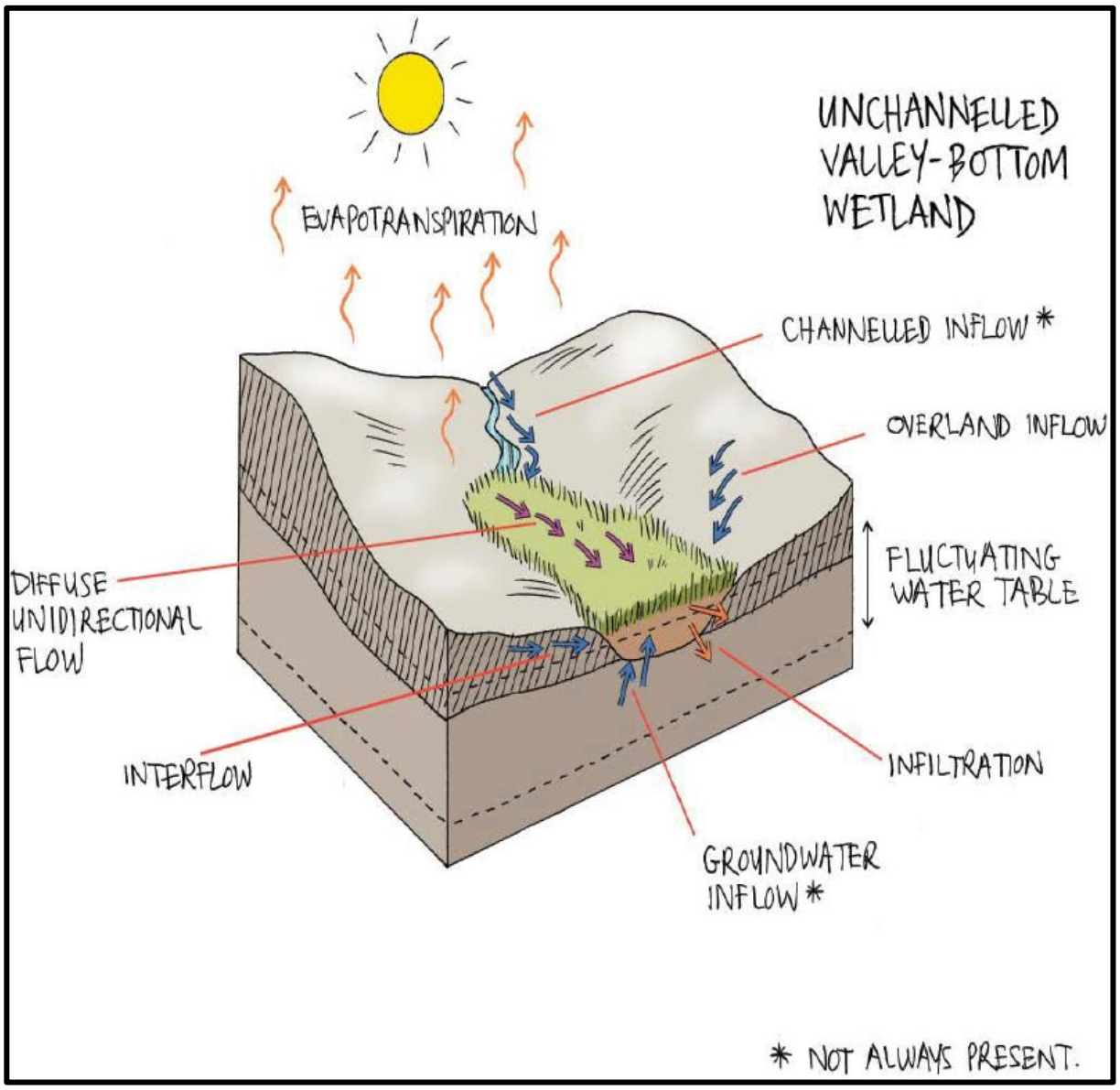


Figure 2.10: An unchannelled valley-bottom wetland (Source: Ollis *et al.*, 2013, p.19).

2.7 Geology and surface structure

The Colbyn Valley Wetland belongs to the Transvaal Supergroup Dolomites stratigraphic unit. This group represents the transition from the Archean to the Proterozoic ages (see Figure 2.11) (Van Staden *et al.*, 2013). According to Hofmann (2011), it has existed for over 2 billion years. Hofmann (2011) further added that the Transvaal Supergroup has three main basins, known as the Transvaal, Griqualand and the Kanye basis. The Transvaal Supergroup is characterised by the bushveld vegetation whilst the Griqualand west is dominated by the Kaapvaal craton that stretches across the border of Botswana and joins with the Kalahari region, also known as the Kanye Basins (Hofmann, 2011).

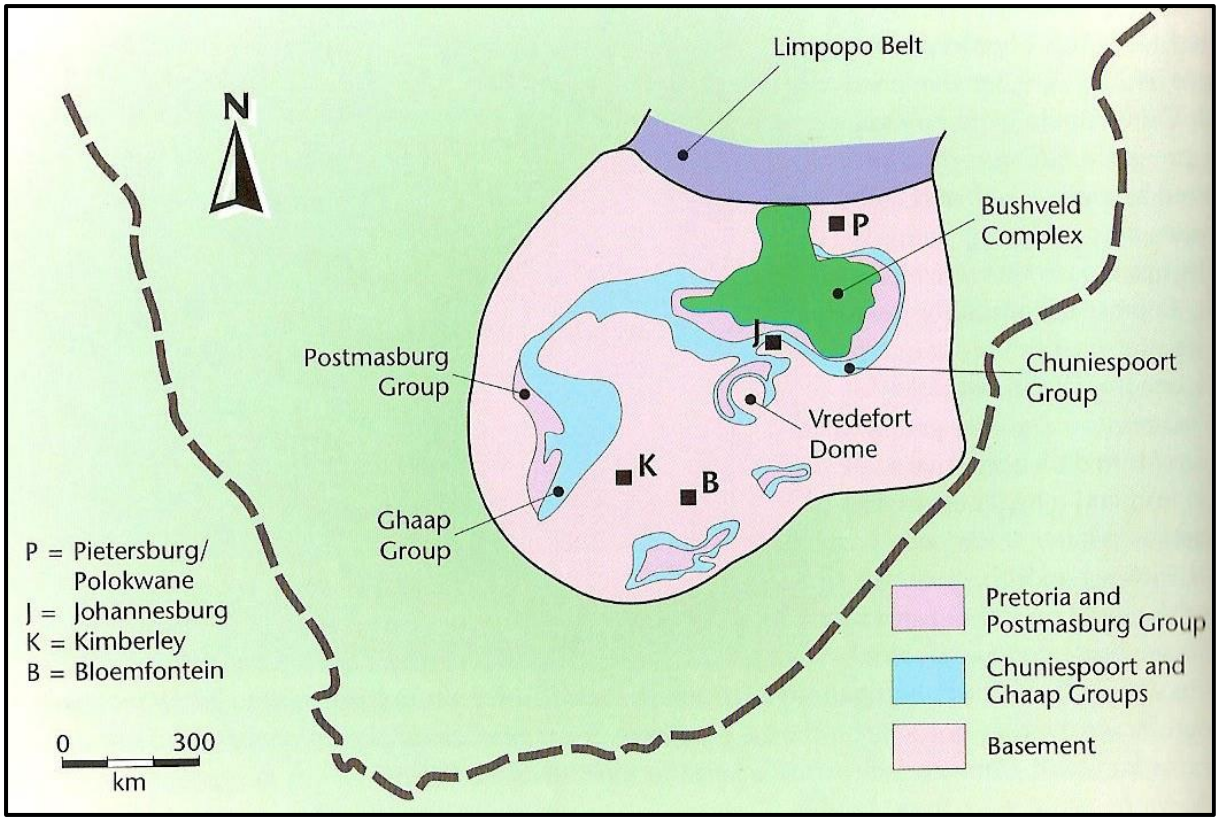


Figure 2.11: Transvaal Super group (Source: University of Pretoria, 2014, p. 2).

The Transvaal Supergroup was further divided into two main groups, namely the Chuniespoort and the Pretoria Group. Above the Chuniespoort lies the Pretoria Group which dominates north Gauteng, including Colbyn Valley Wetland, and is characterised by quartz rock (Van Staden *et al.*, 2013). This group has signs of metamorphosis noticeable on a smaller scale. The group has gold, limestone and the manganese as key mineral deposits.

The underlying geology of the nature reserve is the Strubenkop Formation, which is characterised by quartzite hill (known as 'the koppie'), diabase and gabbro dykes. These four types dominate the northern side of the wetland towards the east that lies under the N1 route, while the remaining part is covered with shale (Hofmann, 2011). The shale rock is part of the Silverton Formation that spreads further east of the wetland.

2.8 Climate

According to the South African Cities Network (SACN, 2014), the City of Tshwane, which includes the Colbyn Valley Wetland, is characterised by annual rainfall averaging just over 670 mm. The SACN (2014) further adds that this area receives much of its rain in summer, which decreases towards the winter. The rain is received largely from October until April.

The daily temperatures of this area vary between 12 – 22 °C all year round. There are notable below average temperatures that fluctuate depending on the season. Thunderstorms accompanied by lighting are common (Van Staden *et al.,* 2013). The area can experience severe damage to infrastructure due to hail and strong winds in summer.

The Colbyn Valley Wetland is considered to be a suitable site for ecosystem-based climate change adaptation (DEA, 2016). Ecosystem-based adaptation to climate change refers to using the biodiversity and associated ecosystems to enhance the resilience of people to the adverse effects of climate change. Ecosystem-based adaptation must enhance the functionality of the ecosystem, while protecting biodiversity, in a manner that responds to climate change while benefiting people and meeting sustainable development principles (DEA & SANBI, 2016).

2.9 Population

To understand the extent of human-induced pressures to the wetland, this case study reflected on the human population that surrounds the site. This includes how the size and economic status of the human population has changed over time and the potential demand for expanded human settlements and other related land development initiatives such real estate or shopping complexes. The Colbyn Valley Wetland is in a neighbourhood with a human population of about 585 159. Administratively they are all part of 23 political wards of Region 3 which includes the Colbyn Valley Wetland (City of Tshwane, 2013b). Region 3 accounts for about 18% of the City's total population of 2.9 million. According to the Regional Integrated Development Plan of 2014-15, the majority of this population is Black African (375 648), followed by white people at 181 114 (City of Tshwane, 2014). The majority of the white community found in this region are concentrated in Ward 82, which includes Colbyn Valley Wetland. The most spoken language in this region is Sepedi; however Afrikaans is most spoken in Ward 82 (City of Tshwane, 2013a).

Some 20 017 people live directly on the border the Colbyn Valley Wetland, in 7 492 household units (City of Tshwane, 2013a). These are the communities who are the immediate recipients of any development in the Colbyn Valley Wetland (Figure 2.12). This area is also one of the areas dominated by a high number of middle and upper-class citizens, while size of the population makes this region the third most densely populated in the city.

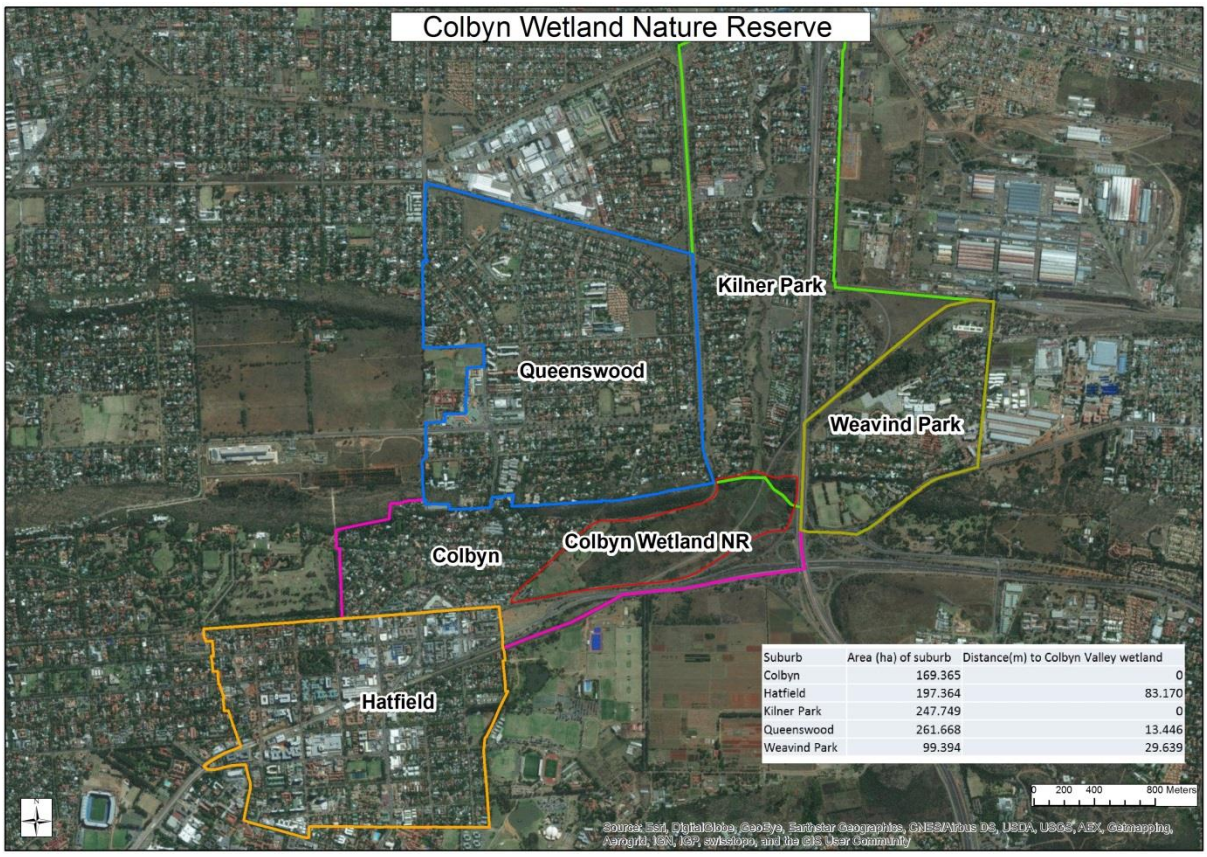


Figure 2.12: Residential areas that surrounds Colbyn Valley Wetland and the distance (m) to the site.

The region currently faces a risk of disasters associated with flooding, as most of the homes are located in the flood plain, with no flood response infrastructure such as flood drainage infrastructure. The high population density also makes the Colbyn Valley Wetland vulnerable to the pressure from built infrastructure that services the large population and dominates the city's economic activities (SACN, 2014).

2.10 Tourism activities

The City of Tshwane (2013b) notes that there are three main purposes of the tourists visiting the City of Tshwane: leisure and entertainment, business, and visiting friends and relatives. The Colbyn Valley Wetland currently offers activities related to avitourism, research and education. Any attempt to protect Colbyn Valley Wetland could therefore add to the network of tourism destinations in the City of Tshwane. Additionally, a number of tourist destinations surround the Colbyn Valley Wetland: The Union Buildings, Pretoria National Botanical Gardens, Freedom Park Nation Legacy and the Voortrekker Monument, to name but a few.

2.11 Water provision and link with the Colbyn Valley Wetland

Water provision in South Africa is challenging, due to the over-exploitation of freshwater resources worsened by semi-arid climatic conditions (DWAF, 2008). The urban sector, which included the City of Tshwane, is one of the largest consumers of water in South Africa, after agriculture (DWS, 2013). Looking specifically at Gauteng, the province does not have sustainable water resources to meet the needs of all its residents. This requires the province to instil responsible consumption of piped water to ensure sustainable use. There also needs to be effective monitoring of water consumption patterns as well as programmes to reducewater usage (DWS, 2013).

The suburbs (see Figure 2.12) surrounding the Colbyn Valley Wetland are supplied with water from the Roodeplaat Dam, which is fed by the Hartbeesspruit (Figure 2.13) that is supported by the wetland. Additional streams draining into the dam are the Moreletaspruit and the Elandspruit. The dam is located to the north east of the Colbyn Valley Wetland. The Roodeplaat Dam was initially known as the Pienaars Rivier Dam and was built in the early 1950s with the intent to supply water to the Montana, Wonderboom and Magaliesberg areas (City of Tshwane, 2013a). After the construction of the dam, the management responsibilities fell to the then Transvaal government (City of Tshwane, 2013a). The dam also has recreational and conservation facilities. It is now a favourable destination for tourists interested in the variety of birds, game and water sport.

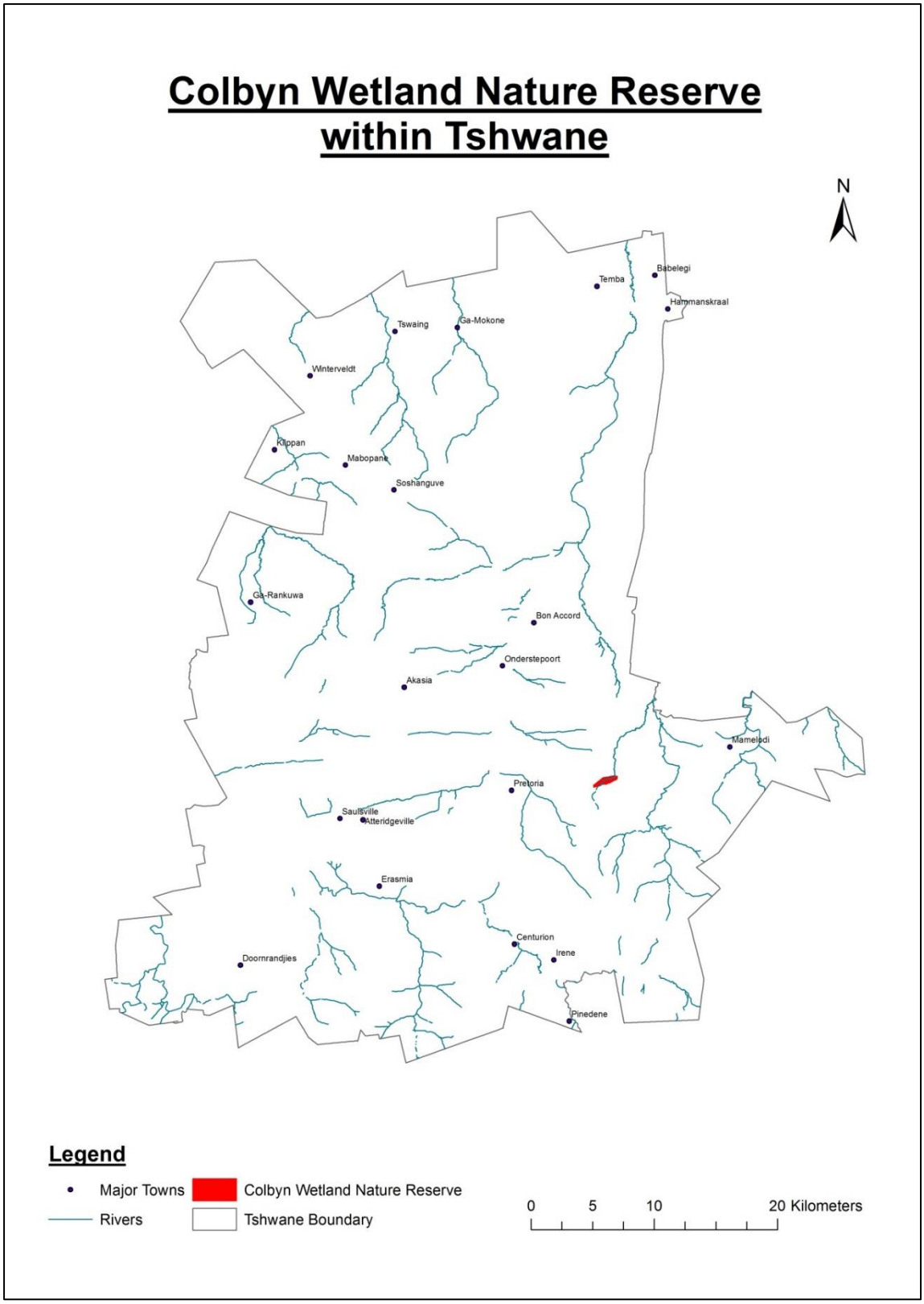


Figure 2.13: Location of Colbyn Valley Wetland in the river system of the City of Tshwane (Source:SANBI: BGIS, 2017).

2.12 Legal prescripts applicable at Colbyn Valley Wetland

The South African government recognises that wetlands, like any other ecosystems, must be properly managed, utilised and protected for the ecosystem services and goods they provide. This requires that a proactive legal framework be put in place to guide and inform society about the value of wetlands. The country relies on both domestic and international policies to respond to the loss and destruction of wetlands. It is important to note that these legal prescripts overlap both in the domestic and international context (Macfarlane, Holness, von Hase, Brownlie & Dini, 2014).

2.12.1 Domestic legal prescripts

The wise use and protection of wetlands is a multi-sectorial responsibility in South Africa. There is no single set piece of legislation that is dedicated to the protection of wetlands. It is for this reasons that there are various stakeholders involved in the management of Colbyn Valley Wetland. These stakeholders are representing their commitment to wetlands from biodiversity, planning and development, agricultural and personal perspectives. Currently, the country uses the following prescripts to manage wetlands.

i. Constitution of the Republic of South Africa Act 108 of 1996

This was one of the first legal instruments that came into law after first the democratic government in South Africa was elected. It would set the path for the future of the country. Section 24 of the Constitution requires that every citizen of the country be afforded an environment that is clean and enhances their wellbeing. This section calls for necessary measures to be put in place to ensure that the environment is protected from any forms of pollution and remains conserved and used sustainably.

ii. Conservation of Agricultural Resources Act 43 of 1983

The main purpose of this Act is to promote sustainable utilisation of agricultural resources, including soil, water sources and indigenous vegetation. The Act requires that all necessary measures be put in place to ensure wetlands are protected within agricultural land. This Act came into effect before 1994, but it was the first legal instrument that considered wetlands as one of the key issues to be addressed in all agricultural land. The Act further states that all land is agricultural land unless stated otherwise. The stakeholders involved in the Colbyn Valley Wetland include the Agriculture Research Council (ARC), which is providing support related to technical and capacity development of local residents and officials. The

Department of Agriculture, Forestry and Fisheries is the custodian of the Act, and the department also has oversight over the ARC.

iii. National Environmental Management Act 107 of 1998

The main purpose of this Act is to guide the decision-making process on activities with a likely impact on the environment. The Act provides for the institutional co-ordination, governance, administration and enforcement necessary in ensuring the environment remains free from any forms of pollution, is conserved and used sustainably. It is this Act that makes land owners responsible for all necessary measures to ensure the land is free from degradation and requires them, where possible, to take steps to rehabilitate and restore lost ecosystems. The Act further enables the development of a programme of actions for the management of wetlands. The management plan guides a set of activities that have to take place on the site to secure the protection of the environment.

iv. National Water Act 36 of 1998

The main purpose of the Water Act is to ensure the country's scarce water resources are utilised, distributed and managed sustainably. The Act provides for the classification, planning and mapping of the critical ecosystems necessary in the provision of water. It is through this Act that wetlands critical to the water provision are effectively enhanced and managed. The Colbyn Valley Wetland is a form of ecological infrastructure, supplying water to the Roodeplaat Dam, which currently supplies water to many parts of the City of Tshwane.

v. National Environmental Management: Biodiversity Act 10 of 2004

The main purpose of the Biodiversity Act is to promote conservation and management of biodiversity, including preservation of species and ecosystems. The Act is necessary for the listing and protection of wetland ecosystems including providing plans necessary to safeguard individual species. Wetlands are necessary habitat for many threatened species of flora and fauna. The Act is relevant at Colbyn Valley Wetland as it enables the listing of threatened species and ecosystems, which helps to guide the proper response for them to be safeguarded.

vi. National Environmental Management: Protected Areas Act 57 of 2003

The main purpose of this Act is to protect and conserve a network of areas necessary for the protection of biodiversity, individual species of fauna and flora, and their ecological networks and ecosystems. It is through this Act that identified priority wetlands can be legally

protected. The Colbyn Valley Wetland was declared under this Act. The Act further determines the duration of protection that must be given to a site.

2.12.2 International legal instruments

South Africa is part of an international community in responding to the call for wetland protection, equitable access and sustainable utilisation. In terms of the Constitution, South Africa is also obliged to adhere to international obligations.

i. Convention on Biological Diversity

This Convention aims to promote conservation of biodiversity, encourage sustainable utilisation as well as ensuring broad access and beneficiation. The treaty was opened for signature at the Conference of Parties on Environment and Development held in Rio de Janeiro, Brazil. It came into effect in December 1993 with South Africa becoming party in 1996. The treaty requires parties, including South Africa, to develop measures to ensure wetlands are managed properly for the biodiversity they host (United Nations, 1992).

ii. Ramsar Convention

The Convention on Wetlands is a multinational treaty aimed at promoting conservation and wise use of wetlands in a manner that contributes to sustainable development through domestic and internal co-operation. The treaty was adopted in the Iranian city of Ramsar in 1971 but came into effect in 1975. South Africa became party to it in 1975 and currently has 23 sites recognised by Ramsar. This treaty helps South Africa with formulation of plans and actions to promote the wise use of the wetlands and the listing, planning and management of wetlands of international importance. The Colbyn Valley Wetland is not a recognised wetland of international importance, but the objectives of protecting it are in line with those of the Ramsar Convention. The wise use and conservation of the wetland ecosystem is particularly important in the urban setting (Ramsar Convention Secretariat, 2016).

2.13 Declaration as a Nature Reserve

The declaration of Colbyn Valley Wetland as a nature reserve was a successful initiative which also attracted other potential opportunities to leverage the natural state of the site for economic growth. This site has attracted support from all levels of government, local residents and the non-government institutions who continue to be involved on a regular basis.

The Gauteng Department of Agriculture and Rural Development (GDARD) (2014) listed the following reasons as to why the site was declared a nature reserve:

- The Colbyn Valley Wetland belongs to the vulnerable Marikana Thornveld vegetation type, of which only 5% is protected. This is one of the primary vegetation types of Gauteng (Figure 2.14).
- The site, in addition to the rich wetland ecosystem, has biophysical factors that enable the accumulation of, and deposition of a special kind of peatland. This is over 7000 years old and found nowhere else in the Pretoria region.
- The Colbyn Valley Wetland is an ecotone for grasslands and bushveld, and as such it carries a diversity of flora and fauna found in both biomes.
- The site discharges and preserves water that flows to the Roodeplaat dam.

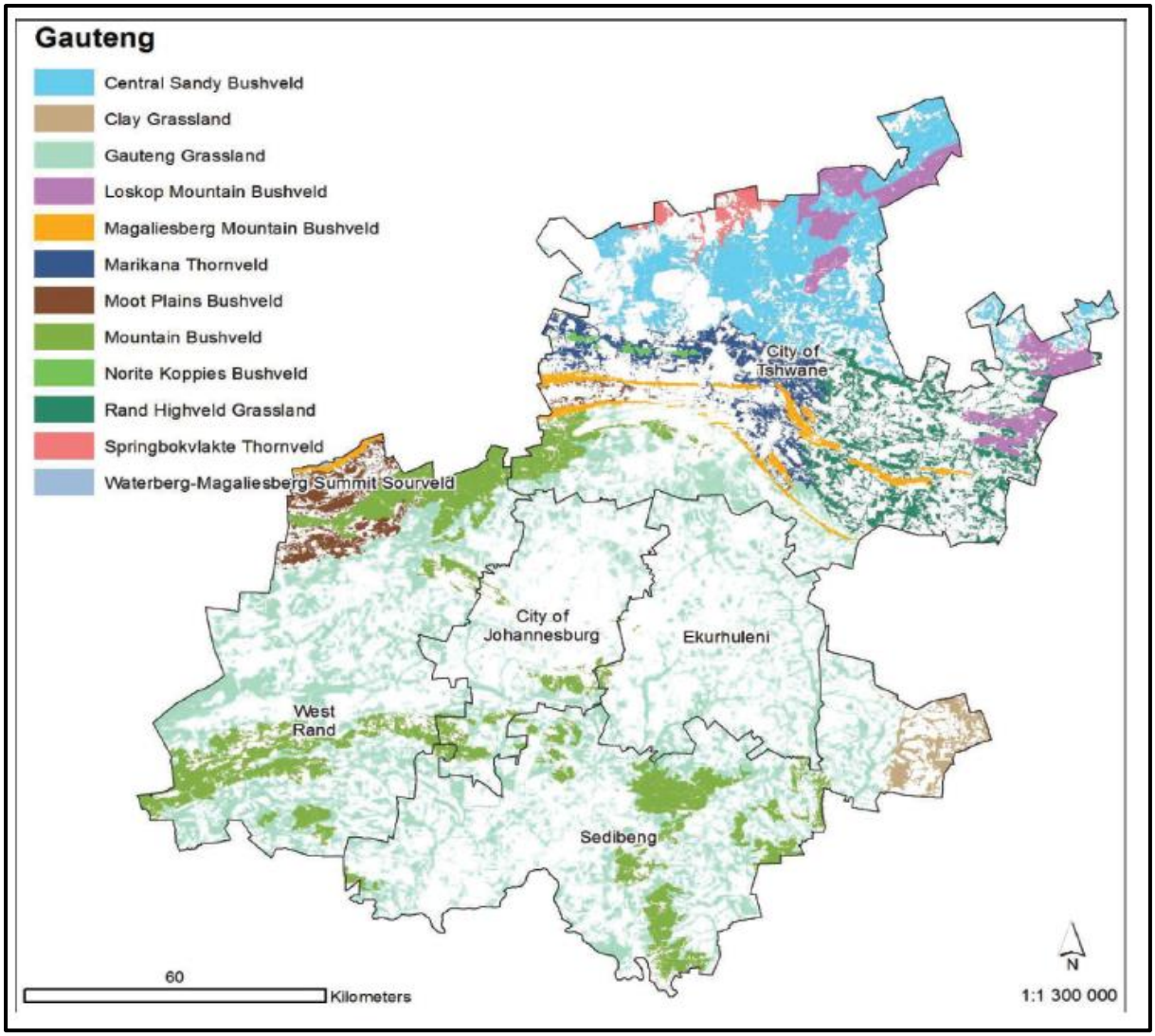
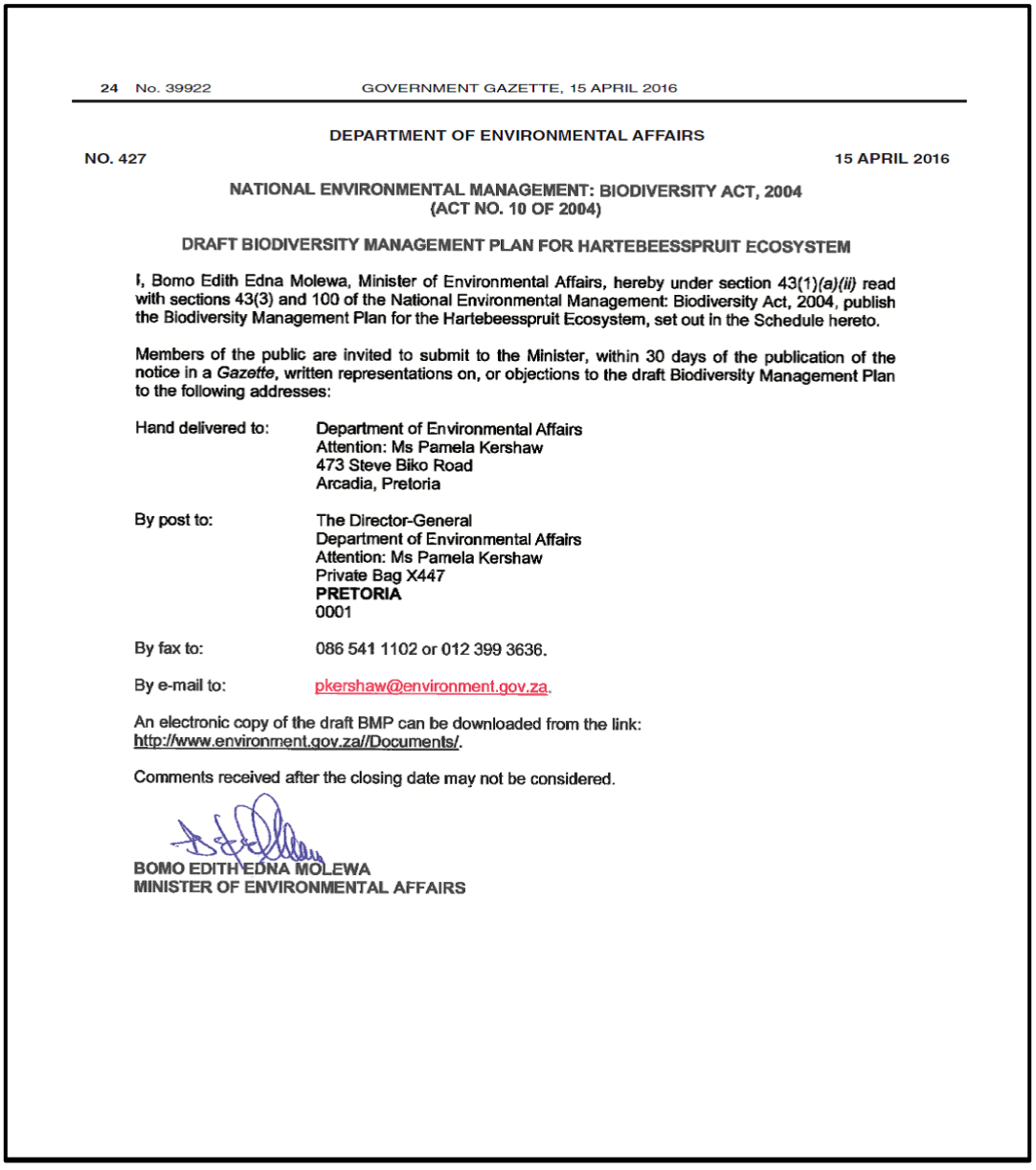


Figure 2. 14: The maps show primary vegetation types of Gauteng (Source: DEA, 2016, p. 21).

The Colbyn Valley Wetland was identified as one of the strategic pilot sites for a Biodiversity Management Plan for an Ecosystem (BMP-E), known as the Hartbeesspruit ecosystem by the national Department of Environmental Affairs (DEA, 2016) (Figure 2.15). A BMP-E is established in terms of the National Environmental Management: Biodiversity Act [Act 10 of 2004] for sites that promote long-term survival in nature (i.e. in a natural or near-natural state) of the ecosystems identified as critical (DEA, 2016). This Act requires the Norms and Standards for BMP-E to be developed to guide the management of ecosystems that are critical (Figure 2.16). The identification of Colbyn Valley Wetland as a pilot for BMP–E adds to the protection status given in terms of the Protected Areas Act. The Hartbeesspruit

Ecosystem BMP-E helps in promoting the sustainable utilisation and management of the resources found on the site (DEA, 2016). It must be noted that in terms of the Norms and Standards of the BMP-E, there may be a certain level of restriction on certain activities on the site to maintain the integrity of ecosystems, but this is done in consultation with all the parties.



24 No. 39922 GOVERNMENT GAZETTE, 15 APRIL 2016

DEPARTMENT OF ENVIRONMENTAL AFFAIRS

NO. 427 15 APRIL 2016

NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004
(ACT NO. 10 OF 2004)

DRAFT BIODIVERSITY MANAGEMENT PLAN FOR HARTEBEESSPRUIT ECOSYSTEM

I, Bomo Edith Edna Molewa, Minister of Environmental Affairs, hereby under section 43(1)*(a)(ii)* read with sections 43(3) and 100 of the National Environmental Management: Biodiversity Act, 2004, publish the Biodiversity Management Plan for the Hartebeesspruit Ecosystem, set out in the Schedule hereto.

Members of the public are invited to submit to the Minister, within 30 days of the publication of the notice in a *Gazette*, written representations on, or objections to the draft Biodiversity Management Plan to the following addresses:

Hand delivered to: Department of Environmental Affairs
Attention: Ms Pamela Kershaw
473 Steve Biko Road
Arcadia, Pretoria

By post to: The Director-General
Department of Environmental Affairs
Attention: Ms Pamela Kershaw
Private Bag X447
PRETORIA
0001

By fax to: 086 541 1102 or 012 399 3636.

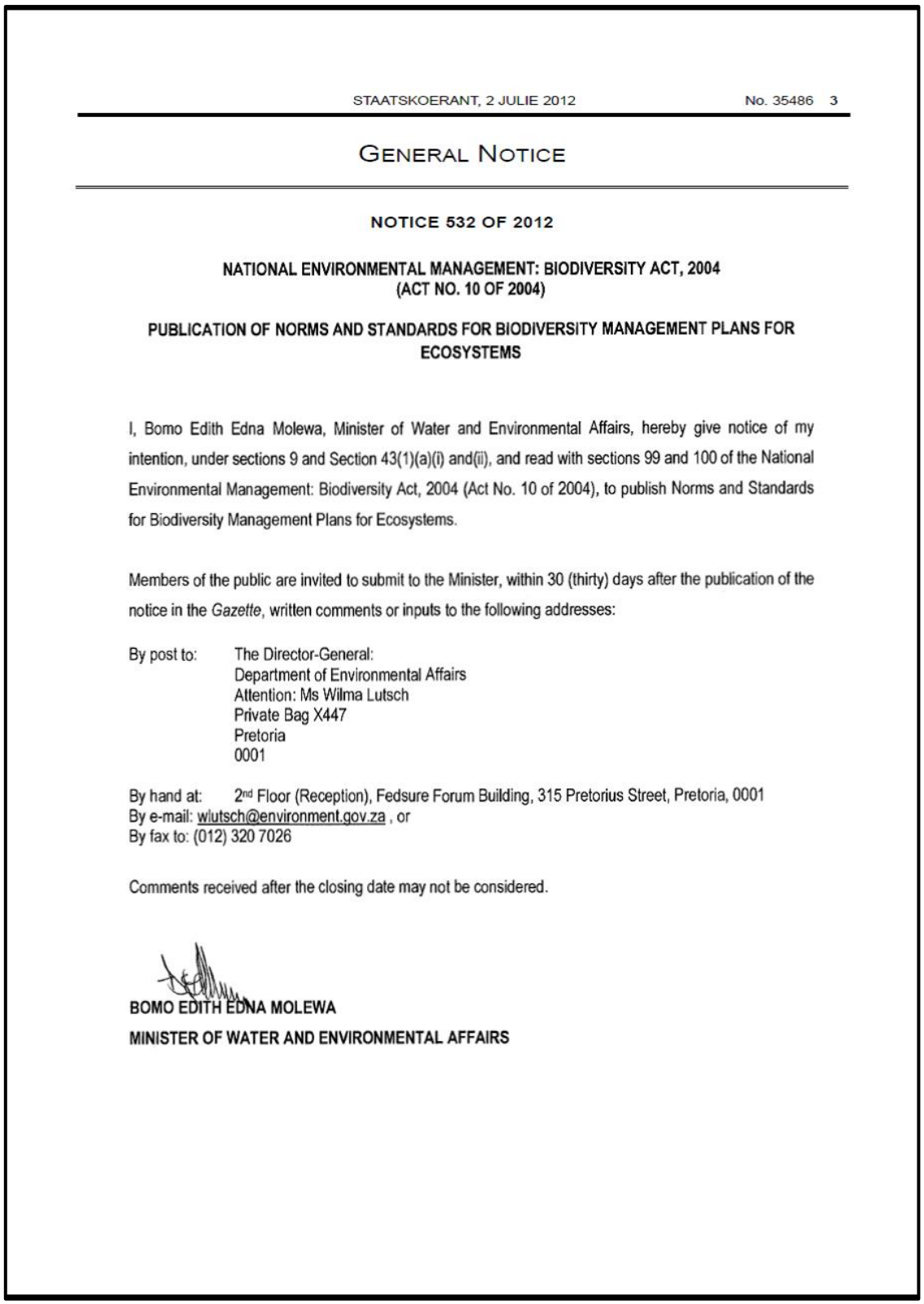
By e-mail to: pkershaw@environment.gov.za.

An electronic copy of the draft BMP can be downloaded from the link:
http://www.environment.gov.za//Documents/.

Comments received after the closing date may not be considered.

BOMO EDITH EDNA MOLEWA
MINISTER OF ENVIRONMENTAL AFFAIRS

Figure 2.15: The notice of intention to publish Biodiversity Management Plan for Hartbeesspruit Ecosystem (Government Gazette No. 39922, 2016).



STAATSKOERANT, 2 JULIE 2012 No. 35486 3

GENERAL NOTICE

NOTICE 532 OF 2012

NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)

PUBLICATION OF NORMS AND STANDARDS FOR BIODIVERSITY MANAGEMENT PLANS FOR ECOSYSTEMS

I, Bomo Edith Edna Molewa, Minister of Water and Environmental Affairs, hereby give notice of my intention, under sections 9 and Section 43(1)(a)(i) and(ii), and read with sections 99 and 100 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), to publish Norms and Standards for Biodiversity Management Plans for Ecosystems.

Members of the public are invited to submit to the Minister, within 30 (thirty) days after the publication of the notice in the *Gazette*, written comments or inputs to the following addresses:

By post to: The Director-General:
Department of Environmental Affairs
Attention: Ms Wilma Lutsch
Private Bag X447
Pretoria
0001

By hand at: 2nd Floor (Reception), Fedsure Forum Building, 315 Pretorius Street, Pretoria, 0001
By e-mail: wlutsch@environment.gov.za , or
By fax to: (012) 320 7026

Comments received after the closing date may not be considered.

BOMO EDITH EDNA MOLEWA
MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS

Figure 2.16: The notice of intention to publish the norms and standards for Biodiversity Management Plans for Ecosystems by the Minister of Environmental Affairs (Source: Government Gazette No. 35486, 2012).

The DEA is aware the declaration of the Colbyn Valley Wetland as a nature reserve was influenced largely by stakeholders. The DEA engaged with all the stakeholders that were involved in the proclamation of Colbyn Valley Wetland (Table 2.3). This includes regular meetings to update stakeholders on the progress made with regards to the development of the BMP-E for the site. This was then followed by a broadened stakeholder engagement which was also opened to other parties that may have been interest (DEA, 2016). The BMP-E takes stakeholder engagement into consideration to ensure:

- Consideration of wishes and expectations of all parties in the overall ecosystem management, including awareness raising.
- Commitment from all parties to ensure all activities to take place on the site are executed and defaulters are taken through necessary legal process.
- That the BMP-E is also linked with other related but necessary administrative procedures of the municipalities such as the Integrated Development Plans. The Municipality is the managing authority and as such there must be a way of ensuring the ecosystem management is within their by-laws.

The Norms and Standards for BMP-E published in the Government Gazette No. 35486 of 2012 require all sites to meet the following principles:

i. Clearly set biodiversity conservation objectives

The overall motive of the Biodiversity Management Plan for the Hartbeesspruit Ecosystem is the protection of biodiversity which enables functionality of the ecosystem. This underpins the planning and management of the site, and integration of suitable activities in line with the overall objectives of the declaration of the site as a nature reserve (DEA, 2016).

ii. Integrated management of terrestrial and freshwater ecosystems

The Hartbeesspruit Ecosystem is an important ecological support area which also enhances water provision to the Roodeplaat Dam (DWAF, 2008). As such, necessary measures had to be put in place to ensure water provision remains for the people of the City of Tshwane who rely on the Roodeplaat Dam (Department of Water Affairs and Forestry, 2008).

These measures are:

a. Use of best available science

The establishment of the BMP-E, like all other plans for better ecosystem management, must always be based on the best scientific knowledge available in practice and academia as required by the Norms and Standards (Driver *et al.*, 2012). The Hartbeesspruit Ecosystem has been identified as a pilot for the Norms and Standards for BMP-E which makes it a necessary foundation for learning, upon which future plans for ecosystem management will be based on (DEA, 2016).

b. Keeping it simple

Another important principle of the Norms and Standards for BMP-E is the ease with which it is compiled for faster implementation and cost effectiveness. It is for this reason that the basis for the development of the BMP-E was consulting the existing stakeholders at the Colbyn Valley Wetlands. The support of stakeholders minimises complications that may arise as result of them not being involved from the onset (DEA, 2016).

c. No recipe

The BMP-E is always different from site to site and as such it must be adapted to the local scale for understanding. The Hartbeesspruit Ecosystem is unique on its own and as such all necessary measures were taken to ensure the plan accommodated the landscape challenges and opportunities, while remaining focused on ensuring the ecosystem is protected (DEA, 2016).

d. Voluntary participation

The stakeholders joined the process voluntarily without any form of compensation but the good deed. The voluntary participation of stakeholders also brought ease in the required considerations with which the wetland was to be protected. (DEA, 2016).

e. Stakeholder engagement and enhanced collaboration

The stakeholders were central to the process of developing the BMP-E, as is also the requirement of the law. The BMP-E remains open to further partnership with other willing stakeholders who were not part of the process initially, as this will ensure effective implementation (DEA, 2016).

The development of the Hartbeesspruit BMP-E has received representation from all diverse stakeholder groups, making it comprehensive and responsive to the needs of all the

stakeholders (Table 2.3). The DEA (2016) was able to capture the submissions from all stakeholder groups. This is a key process in the development of the BMP-E, mentioned in the Norms and Standards of BMP-E. Table 2.3 shows the list of the stakeholders involved in the development of the Hartbeesspruit BMP-E.

Table 2.3: List of stakeholders involved in the development of the Hartbeesspruit BMP-E (Source: DEA, 2016, p. 35).

Representative	**Organisation**	**Stakeholder Group**
Dr Piet-Louis Grundling	Centre for Wetland Research and Training	Tertiary
Ms Anneli Kuhn	Adopt Moreletaspruit Forum	Primary
Mr Mike Silberbauer	DWS	Secondary
Dr Althea Grundling	ARC	Tertiary
Mr Ernst Wohlitz	City of Tshwane	Secondary
Ms Wilma Lutsch	DEA	Secondary
Ms Santhuri Naidoo	DEA	Secondary
Ms Lucia Motaung	DEA	Secondary
Ms Pamela Kershaw	DEA	Secondary
Dr Geoff Cowan	DEA	Secondary
Mr Karl Naude	DEA	Secondary
Mr Ryan Nawn	FoCV	Primary
Mrs Hlengiwe Cele	FoCV	Primary
Mr Philip Calinikos	FoCV	Primary
Ms Tamsyn Sherwill	FoCV	Primary
Ms Claire Wagner	FoCV	Primary
Mr Andre Swart	FoCV, Hatfield Village group	Primary
Mr Piet Snyman	FoCV/Agricultural Research Council	Primary
Ms bigail Kamaneth	GDARD	Secondary
Ms Christina Seegers	GDARD	Secondary

Mr Petrus Links	GDARD	Secondary
Mr Alexander Heunis	City of Tshwane	Secondary
Ms Shela Patrickson	ICLEI	Tertiary
Ms Liz Metcalfe	ICLEI Cities Biodiversity Centre	Tertiary
Ms Shannon Mayne	Mayne 5th Hillcrest-Colbyn Scout Group/FoCV	Primary
Ms Budu Manaka	South African National Biodiversity Institute	Secondary
Mr Atthys Dippenaar	University of Pretoria	Tertiary
Ms Siobhan Muller	Ward Councillor, FoCV	Primary
Mr Eric Munzhedzi	DEA: Working for Wetlands	Secondary
Mr Conride Mhlari	DEA: Working for Wetlands	Secondary
Mr Retief Grobler	DEA: Working for Wetlands	Secondary

2.14 Conclusion

The Colbyn Valley Wetland is not only about the protection of the biodiversity and associated ecosystems but an opportunity to understand the prioritisation of developmental needs by government, ordinary citizens and civil society in general, as well as the power play between them. The site also presents a reflection of the historical evolution of grounds for the establishment of protected areas to the modern day systematic planning for biodiversity conservation. The Colbyn Valley Wetland, despite its small size, is protecting the critical biodiversity (flora and fauna), important ecological support areas, threatened wetland ecosystems, and it supports the stream flow that contributes to the provisioning of water in the City of Tshwane.

CHAPTER 3: LITERATURE REVIEW

3.1 Introduction

The purpose of this chapter is to review the existing literature on protection of wetlands. The review considers both South African and international literature. The chapter distils the modalities of protecting wetlands within the confines of the law, and the options for voluntary protection. It then presents the role of stakeholders in protecting wetlands.

The protection of wetlands involves establishment of measures to regulate, control and guide access and utilisation of the wetland (Chatterjee, Phillips & Stroud, 2008). The introduction of the Ramsar Convention in 1972 enabled many programmes, models and resources to protect wetlands. The main purpose of the Convention is to promote preservation and sustainable utilisation of wetlands. The Convention notes that the world has already lost about 64% of wetlands, particularly in Asia (Ramsar Convention Secretariat, 2015).

The Convention has acknowledged factors that impact on wetlands, particularly the pattern of land use in and around wetlands (Chatterjee *et al.,* 2008). In their natural form, wetlands do not need the aid of human beings to remain functional. The Ramsar Convention argues that every wetland has all the natural components to ensure they stay functional and healthy (Ramsar Convention Secretariat, 2007).

The need for proper protection of wetlands arises from centuries of alterations by various competing interests for the site of wetland (Millennium Ecosystem Assessment, 2005). Wetlands are one of the few ecosystems that, if managed properly, are able to become compatible with many land uses (Chatterjee *et al.,* 2008). It is important to remember that there is a clear distinction between wetlands that are managed with the sole intention of their ecosystem services and goods, and those that are transformed for commercial purposes.

Wetland ecosystems in their entirety provide direct and indirect benefits to millions of populations across the world (Millennium Ecosystem Assessment, 2005). Such benefits are generally known as ecosystem goods and services. Some of these goods and services possess huge economic value, whilst others are source of job opportunities or are of importance to the general wellbeing of people. Various authors agree that the volume of ecosystem goods and services generated from wetlands is dependent on the geographical location, climatic characteristics of the area and the landscape in general. Wetlands are natural filters for waste as they trap dense materials that would otherwise pollute running water thereby making it

difficult to clean. They also absorb and remove harmful toxins and further regulate the amount of nitrates found in the water to a minimal ratio. These aspects, in turn, reduce the costs of cleaning drinking water (Chatterjee *et al.*, 2008). Wetlands provide natural storage of carbon which mitigates climate change (Ramsar Convention Secretariat, 2007).

3.2 Stakeholder engagement

Stakeholder engagement is defined broadly as the process by which interested and affected parties are brought together around the topic of interest for them to share their views for consideration (Novoa *et al.*, 2018). The conservation of biodiversity and associated ecosystems requires the participation of all stakeholders (Secretariat of the Convention on Biological Diversity & Netherlands Commission for Environmental Assessment, 2006). This is the basis upon which the International Convention on Biological Diversity requires authorities to secure critical biodiversity or threatened ecosystems (Secretariat of the Convention on Biological Diversity & Netherlands Commission for Environmental Assessment, 2006). The participation of stakeholders is recognised and supported through various international conventions, policies and structures working on biodiversity and related ecosystems, such as the Convention on Biological Diversity, the Ramsar Convention and the Sustainable Development Goals, amongst others. Globally, the stakeholder engagement process is the entry point to development of measures to respond to biodiversity conservation targets and plans for effective implementation of responsive programmes (Sterling *et al.*, 2017). There are various techniques that are used internationally to ensure stakeholders are engaged. These include understanding the scope of work to be done and the purpose of doing it before the selection of parties to be engaged. In the context of conservation of biodiversity this includes understanding of the network of influence from the local community structures, the historical significance of the stakeholders, the demographic compositions and the value of the biodiversity or ecosystem to be secured (Sterling *et al.*, 2017).

South Africa has adopted the consultation of stakeholders as a legally binding process for any decisions or actions with the likely possibility to impact the environment in general in terms of section 24 of the National Environmental Management Act [Act 107 of 1998]. This consultation is not limited to any geographic or spatial location of the biodiversity and associated ecosystem to be conserved. In some instances, stakeholder engagement has become the basis upon which projects or developments are halted when the consultation is not sufficient or was not done properly. The country has also set the norms and standards

upon which consultation of stakeholders should be conducted for specific competency areas such as protected areas management. The government uses legal frameworks like these to enhance participation of stakeholders, which in turn contributes to effective management of sites secured (Novoa *et al.,* 2018). Engaging stakeholders also helps to prevent the flaunting of legal process for immediate results by responsible parties. The country also uses democratic principles of consensus-based governance, representivity, objective rule of law, as well as access, and recognition of human rights in deciding who has to be engaged (Novoa *et al.,* 2018).

3.2.1 Selection of suitable stakeholders

There are various ways in which stakeholders are meaningfully engaged. This could be voluntary or mandatory engagement with the common goal of effectively managing ecosystems and biodiversity (Secretariat of the Convention on Biological Diversity, 2012b). The process of identifying stakeholders must be fair, inclusive and representative of other necessary demographics of the affected and interested stakeholders (Secretariat of the Convention on Biological Diversity, 2012b). The process must also comply with the set rules and principles of engagement that suits the participation of all stakeholders.

i. Ability of stakeholders to deliver on set goals

The selection of stakeholders must embrace the diversity of skills and competencies that each stakeholder brings. The Convention of Biological Diversity requires countries to conduct an audit of the skills required to manage ecosystems and biodiversity and optimise on these skills, while building new talent for continuity (Secretariat of the Convention on Biological Diversity, 2012b). This is supported by regular inductions to member states or parties with poor skills pool to draw on for management of ecosystems and biodiversity (Secretariat of the Convention on Biological Diversity, 2012b). This training ensures authorities are able to engage stakeholders at all levels and good relationships are built to sustain all meaningful interventions for improved management of ecosystems (Secretariat of the Convention on Biological Diversity, 2012b).

In South Africa, the Department of Environmental Affairs has skills and competency development integrated in the legal frameworks for broad environmental management to ensure officials are trained to deal with stakeholders affected by any decisions or actions to protect the environment in general. This is largely driven by the Environmental Sector Skills

Plan, which also conducts skills auditing for the sector and mobilises resources for capacity development (Government of South Africa, 2015).

ii. Alignment of institutional objectives

The Convention on Biological Diversity is an instrument for sustainable biodiversity management by member countries or parties who are the primary stakeholders to the Convention (Secretariat of the Convention on Biological Diversity, 2012a). The Convention guides how countries must respond to their domestic needs for biodiversity and ecosystem management using internationally recognised best-practices (Secretariat of the Convention on Biological Diversity, 2012a). It is for this reason that the Convention requires member states or parties to present their 'county report' on what they are doing to manage their biodiversity and associated ecosystems, as well as developing National Biodiversity Strategies and Action Plans (Secretariat of the Convention on Biological Diversity, 2012a).

South Africa has consistently provided these reports that are derived from a rigours process of consulting all the necessary stakeholders to ensure the report and plans are comprehensive and include all key issues that the country faces. The consultation that South Africa conducts with the stakeholders in compiling the necessary reports ensure all parties agree to the report and plans, while lessening any frustrations that may arise when trying to implement them (Government of South Africa, 2015).

iii. Engaging partnership

A partnership for sustainable development should be based on mutual understanding and respect between parties. Sustainable Development Goal 17 stipulates that sustainable development can only be achieved through decent partnerships. The concept of partnership runs through many policies and programmes that adopted by the international community. This is also true for biodiversity and ecosystems management, particularly when working with variety of stakeholders from different backgrounds, with varying scales of social circumstance, but surrounded by rich biodiversity and functional ecosystems.

South Africa derives key policies and programmes for broad environmental management from commitment of partners who support the implementation, secure funds and monitor compliance in support of the national objective of a clean, secure and healthy environment for all. There are varying scales of partnerships that South Africa uses as drivers of biodiversity and ecosystem management programmes, such as Working for Wetlands,

Working for Water, and transfrontier parks. All these programmes are based on responsive and considerate partnerships with stakeholders (Government of South Africa, 2015).

3.2.2 Causes of poor stakeholder engagement

The Convention on Biological Diversity has admitted that that despite their plausible success in working with all the parties or member states there are frightening challenges that the convention faces in continuing with its objectives (Secretariat of the Convention on Biological Diversity, 2012b). The Convention on Biological Diversity states that effects of poverty in poor countries, the state of inequality in developing nations and the rate of unemployment are amongst some of the main difficulties that the Convention faces globally (Secretariat of the Convention on Biological Diversity, 2012b). This is worsened by continuous climate change and variable rainfall distribution, which in turn affects food security, soil productivity, water provisioning and exacerbates the spread of invasive alien species.

South Africa is seeking solutions to problems of poverty, inequality and unemployment which in turn leads to affected stakeholders, particularly local communities, exploiting natural resources for their immediate fulfilment. However, these efforts receive less support from various stakeholders due to rampant corruption, nepotism, crime and political interference. Many local communities struggle to trust government when it comes to process of securing biodiversity, including the management of already secured sites (Government of South Africa, 2015).

i. Conflicting institutional mandates

Despite the broad process of engaging member states who are the primary stakeholders to the Convention on Biological Diversity, there are still countries failing to get the basics right on improving management of biodiversity and ecosystems (Secretariat of the Convention on Biological Diversity, 2012b). The approval of applications for corrosive business development, such as mining in sensitive areas of biodiversity and ecosystems (such as river catchments or estuaries), continues (Secretariat of the Convention on Biological Diversity, 2012b). This has resulted in irreversible loss of biodiversity and ecosystems.

The South African government is often caught in a difficult position when it comes to balancing business development with conservation of biodiversity, particularly on mining in sensitive areas. The state has had to have several engagements with local stakeholders who

often rejecting mining but is overpowered by political decisions interested in deriving profit from the mining companies. This has resulted in the misunderstanding between local stakeholders and government on where the priority lies (Government of South Africa, 2015).

ii. Inability to retain and attract competent professionals

The Convention on Biological Diversity has also noted varying levels of existing capacity to manage biodiversity and associated ecosystems from its member states (Secretariat of the Convention on Biological Diversity, 2012a). Some member states have advanced capacity, yet other countries lack the minimum required to manage a site for conservation purposes. The level of capacity determines a country's competency to develop responsive policies within the domestic context without contradicting other political responsibilities (Secretariat of the Convention on Biological Diversity, 2012a). Some countries also lose skills to developed countries that are better able to compensate the services of skilled and competent professionals (Secretariat of the Convention on Biological Diversity, 2012a). This leaves a void within countries that do not have the necessary financial incentives to keep the best talent or professionals in the field of biodiversity and ecosystem management.

South Africa is regarded as one of the best countries when it comes to biodiversity and ecosystem management. The country is able to build capacity and attract some talent to help in managing biodiversity and ecosystems. The country draws experts from across the African region, and more broadly, who assist in managing biodiversity and ecosystem both at floral and species level. This has left other countries particularly in southern Africa with limited capacity to conserve biodiversity and manage ecosystems (Government of South Africa, 2015).

3.2.3 Conclusion

This study understands that the international recommendations for stakeholder engagement are not always a perfect fit for each country across the globe. Each country has to account for its constitutional rules that govern the process of engaging stakeholders, while encouraging the adoption of internationally recognised best practice methodologies for managing biodiversity and ecosystems. The participation of stakeholders improves the effectiveness of managing biodiversity and ecosystems, and minimises revolts from affected parties, particularly landowners, custodians or users.

3.3 Status and trends of wetlands

Wetlands make up some 4 – 6% of the Earth's surface and are found across all the continents, except Antarctica (Millennium Ecosystem Assessment, 2005). Globally, wetland ecosystems are threatened, despite numerous efforts to protect them (Hu, Niu, Chena, Li, & Zhang, 2017). Many of these efforts are dependent on financial and skilled human resources, thereby making it difficult for poor countries to respond to the global need for wetland protection (Chaikumbung, Doucouliagos & Scarborough, 2016).

Wetlands reflect many features of the landscape in which they occur. The features include the type of soils, plants and animals found in them, as well as their lifespan. Wetlands also include marine water with depth less than six meters at their lowest point (Wetlands International, 2014; International Water Management Institute, 2014).

Wetlands with functional ecosystems play a critical role in the lives of the people. Local communities surrounded by healthy wetlands enjoy a suite of benefits such as grazing for livestock, reeds and grass harvest for shelter, cultural crafts, fishing, tourism and other recreational activities (Millennium Ecosystem Assessment, 2005). The quality of wetlands also determines the value of ecosystem goods and services to be derived. The quality of wetlands is a subject of size, surrounding land uses and the form of management in place.

South Africa has approximately 300 000 wetlands of different scales. Most of these wetlands are under some form of threat caused by overgrazing, mining, dam construction, excessive use of pesticides, and a lack of planning for infrastructure development (Driver *et al.* 2012). Wetlands in South Africa are defined within the context of the National Water Act [Act 36 of 1998] as "*land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil*".

South Africa has already lost 50% of its freshwater wetlands due to poor land management (DEA, 2012). There are measures that South Africa has adopted; both in the legislative and policy context, to address the decline in wetlands. This includes the adoption of an action plan to protect and conserve wetlands found within the country's boundaries (DEA, 2012). Efforts to address wetland loss include the response strategy, education, empowerment and capacity development. There is also a focused restoration, rehabilitation and management

programme known as 'Working for Wetlands'. This programme is guided by the international standards as well as domestic legal framework to address wetland degradation.

3.4 Status and trends of peatlands

Peatlands are formed when water filled environments accumulate soil whose organic matter is derived entirely from dead materials (International Peat Society, 2010). Peatlands occupy about 3% of the earth's land surface or about 400 million hectares, with 88% of them found in the northern hemisphere (Strack, 2008). Many of the peatlands across the Earth's surface occur within wetlands (Millennium Ecosystem Assessment, 2005). About 10% of the Earth's water is found in peatlands (Van Vuuren, 2010). Besides enhancing the capacity of wetlands, in their natural form, peatlands are rich in soil organic carbon necessary for soil fertility. They are important for the storage of carbon dioxide, plant growth and soil structure, as well as biological and physical properties of ecosystems (Strack, 2008).

Due to a lack of dissolved oxygen, peatlands repeatedly accumulate more plant materials than they can decompose, thereby building a thick layer (Priest, 2012). Most of the peat in the southern hemisphere is found in tropical peatlands, so only 10% of South Africa's wetlands contain peat. South African peatlands are characterised by reeds, sedges and grasses, unlike the northern hemisphere where peat moss is dominant. South Africa currently boasts about 460 peatlands classified in 11 peatland ecoregions located in the wet coastal and inland regions. About 60% of these wetlands are found in the Maputaland Centre of Endemism, which is the home of the biggest peatland, the Mkhuze delta (Van Vuuren, 2010).

South African peatlands are managed and regulated within the context of other wetlands and there is no specific legislation for them. The extraction of peat must be subjected to the Environmental Impact Assessment as required by the National Environmental Management Act [Act 107 of 1998]. There is a reported inconsistency in the application of the legislation due to an overlap in responsibilities and the capacity gaps of the officials who are tasked with these responsibilities (Van Vuuren, 2010). Van Vuuren (2010) further add that these problems threaten a number of species that depend on the existence of peatlands, including species that require acidic, waterlogged and poor nutrient habitat, such as ferns.

3.5 Factors affecting management of wetlands

The international community agrees on the common factors hindering effective management of wetlands (Bobbink, Beltman, Verhoeven & Whigham, 2006). These factors range from a

lack of necessary data or information about wetlands, to a lack of will or clear motive for protection of wetlands, limited political commitment, or lack of financial and human resources (Jones, Lanthier, van der Voet, van Valkengoed, Taylor & Fernández-Prieto, 2009). All of these factors result in poor management of wetlands (Bobbink *et al*., 2006). The complexities of these factors have been discussed by the international community gathering at different conferences and workshops, to effectively find long-lasting solutions. The fact that wetlands are poorly managed across the world was one of the reasons that countries agreed on the need for the international Convention on Wetlands – the 'Ramsar Convention'. However, it is important to note that efforts to manage wetlands are not the same across countries.

There are multiple consequences from the poor planning and management of wetlands (Chatterjee *et al*., 2008). Wetlands of international importance that have been declared, known as Ramsar sites, are some of the most well-preserved wetland ecosystems across the world (Ramsar Convention Secretariat, 2007). These wetlands are managed sustainably and have the required leadership and resources to achieve their objectives. However, those that are not Ramsar sites often lack the management basics, such as reliable, consistent and accurate ecological information. This makes it difficult to formulate policies to safeguard them. The collation of information on wetlands depends on the co-operation and co-ordination of the limited resources available (Jones *et al.*, 2009). The loss of wetlands due to poor management is not only a problem to human beings, but to biodiversity as whole.

The continued threats have resulted in the loss of about 60% of wetlands in South Africa. Some of the factors threatening wetlands in South Africa range from legal framework, the prioritisation of other needs and the competition for resources in the already constrained state budget.

For the sake of this study, the following factors were considered:

3.5.1 Lack of wetlands data

For the Ramsar Convention to inform national action through co-operation on wetland management there must be a provision of suitable wetland data (Jones *et al.*, 2009). Jones *et al*. (2009) further add that suitable data must encompass a standard lexicon, with similar foundations for inventories of wetlands, an adoption of principles for wetland inventory that are compatible with countries' systems of identifying wetlands, as well as contribution to the

scientific knowledge and understanding of wetlands. The Millennium Ecosystem Assessment (2005) add that this data must include the characteristics and composition of wetlands, as well as their geographical distribution. The data must be used to monitor changes and update information, thereby ensuring some consistency of usage (Jones *et al.*, 2009). A lack of wetland inventory affects the decision-making process and as a result the management of wetlands (Millennium Ecosystem Assessment, 2005).

South Africa, like many other countries, is doing its best to list, identify, characterise and classify all the wetlands. However, much is still unknown about the historical occurrence of the wetlands. The lack of data has resulted in some approved decisions to place development in areas that were previously wetlands (Sieben, Mtshali & Janks, 2014). It is only during natural disasters such as floods, that people are reminded that a wetland previously occupied the site. There is a need for research to support the discovery of wetlands. Wetland inventories need to be regularly updated to understanding the full status of wetlands.

3.5.2 No clear resolve on land tenure

The United Nations (2009) claims the process of accessing land, ownership and rights is a common problem in many developing and poor countries that are former colonies. Many communities in these countries have been forced from their land, dispossessed and have lost the connection they have with their natural resources (United Nations, 2009). According to the Food and Agriculture Organisation (FAO) (2011) the forced removals have also undermined the indigenous knowledge that helped to prevent exploitation of natural resources for many years. It is often unfortunate that when the process of redressing land and forced removal is undertaken, there is little attention paid to the plans and commitments to develop the land, thereby reducing sustainability (FAO, 2011).

The history of South Africa in the declaration of sites as protected areas shows little or no consideration towards the local landowners (Government of South Africa, 2010). In many cases, the displacement of communities to unknown and less productive lands was a forced process (Driver *et al.*, 2012). This has put the future of protected areas in jeopardy due the constitutional provisions which allows forced land removals to be addressed in the form of land claims. This process has undermined possible trade-offs that could be made based on the value that the land has provided. South Africa is currently using biodiversity stewardship programmes as a vehicle to protect valuable biodiversity. Biodiversity stewardship involves the management of biodiversity priority areas on private and communal land through a

contractual agreement instead of the traditional method of buying the land (Government of South Africa, 2010).

3.5.3 Lack or constrained capacity for wetlands management

One of the critical problems in wetland management is the lack of necessary skills and competencies required to manage a proclaimed site (Rebelo, Finlayson & Nagabhatla, 2009). This also extends to landowners who are affected by the proclaimed wetland site (Chatterjee *et al*., 2008). There are reported cases of collapsed governance and the misuse of dedicated financial resources intended for the improvement of the proclaimed sites (Rebelo *et al*., 2009).

The 11th Meeting of the Conference of the Parties to the Convention on Wetlands held Bucharest, Romania in 2012 has agreed that informal indigenous knowledge should be used to promote sustainable utilisation of wetlands (Ramsar Convention Secretariat, 2012). However, this needs some technical and scientific support to ensure that the correct methodologies are followed. Having the right skills and necessary competency ensures sustainability of the proclaimed wetland sites, and the expansion to include other surrounding protected areas (Chatterjee *et al*., 2008). The Ramsar Convention has also published the 2016 – 2024 strategic plan to guide, amongst other processes, capacity building for wetlands management (Ramsar Convention Secretariat, 2012).

South Africa also lacks the skills and capacity to manage proclaimed sites (Driver *et al.*, 2012). Many wetland site managers are either from generic nature conservation backgrounds, or from the environmental sciences, both of which are limited in terms of the depth of knowledge required to manage a wetland. There are many wetlands that could have been proclaimed as protected areas if the government or responsible authorities had the necessary skills (Cadman, Petersen, Driver, Sekhran, Maze & Munzhedzi 2010). There is a lack of technical skills to make critical assessments of the wetlands before they are declared a protected area. This includes constrained or lack of skilled personnel to handle the negotiation process of entering into contract with landowners through biodiversity stewardship. In some instances, non-government organisations are assisting authorities with financial resources and with personnel to ensure that wetlands and their ecosystems are protected (Government of South Africa, 2010).

3.5.4 Overlapping political oversight of wetlands

When wetland management methodologies are implemented, there are often political circumstances and relationships to manage, follow and consider (Millennium Ecosystem Assessment, 2005). Some wetlands are left vulnerable or undeclared because of political disagreements between the parties that are affected (Chatterjee *et al*., 2008). In some cases, the existing national legislation, which is executed by political heads, is detrimental to the proclamation of wetlands (Lockwood, 2010). Adapting to these circumstances during the planning and management of wetlands prevents further problems (Chatterjee *et al*., 2008).

According to the Department of Environmental Affairs (2013), wetlands are assessed, defined and listed within the context of the National Water Act, whilst their protection is facilitated through the Protected Areas Act. The National Water Act is currently under the political administration of the Department of Water and Sanitation, whilst the Protected Areas Act is under the Department of Environmental Affairs. These departments have different political responsibilities, making it difficult to manage the overlapping administration of wetlands. Wetlands are also a critical component for consideration in the Environmental Impact Assessment process. This means that any intention to alter the wetland for any reasons should be approved by means of an application to the relevant authority (DWS, 2013). Despite their value, it is difficult to locate the proper political home of wetland ecosystems, which affects financial resource mobilisation and capacity development. This has severely undermined the preservation of wetlands due to separate regulatory frameworks.

3.5.5 Compatibility of wetlands with other land uses

The compatibility of wetlands with other land use is seen as the most valuable opportunity in their sustainability (Calhoun, Mushet, Bell, Boixd, Fitzsimons & Isselin-Nondedeu, 2016). However, this compatibility subjects wetlands to abuse when developers fail to adhere to the minimum conditions set to protect these ecosystems (Chatterjee *et al*., 2008). In most cases, wetlands are consumed by the dominant land-use, which was originally perceived as compatible with the wetlands (Calhoun *et al.,* 2016). Examples of this include the establishment of a golf course in the wetlands with the removal of certain species that are necessary for the survival of wetlands. The wetlands turn out to be artificial, with many modifications made to them. To avoid this problem, there is a need to review land use applications that claim to be compatible with wetlands.

The Spatial Planning and Land Use Management Act [Act 16 of 2013] encouraged the use of land in a manner that accommodates the needs of all sectors found in the landscape. This Act further empowers spheres of government to develop integrated systems of land-use management and economic development, particularly on a municipal scale (Government Gazette No. 36730, 2013). The Act complements other government policies encouraging compilation of Environmental Impact Assessment for sound environmental decision making. If the intended activity does not address impacts to existing natural features, the activity may not be approved or the approval will take longer than expected while an alternative plan is sought.

3.6 Measures to improve wetlands management

The focus of this section is on the existing knowledge regarding best-practice standards for managing wetlands.

3.6.1 Strengthening and aligning legal frameworks for wetlands

Globally, wetlands receive overwhelming support in the form of conventions and international programmes to aid the efforts for their protection (Millennium Ecosystem Assessment, 2005). Notably, the international community has agreed on the Ramsar Convention which is the only treaty that focuses on one type of ecosystem (Ramsar Convention Secretariat, 2007). However, this is completely the opposite in individual countries, where wetlands are usually managed as part of the water resources, natural resources or biodiversity (Ramsar Convention Secretariat, 2012). It is often difficult to make provisions for penalties for fragmentation or illegal removal of wetlands due to the lack of specific legislation that regulate these ecosystems (Ramsar Convention Secretariat, 2007). The Ramsar Convention Secretariat (2007) further add that the development of specifically focussed legislation in individual countries, similar to the international community, will be helpful in the sustainability of wetlands.

South Africa is working hard to ensure alignment of legal frameworks in the management of wetlands (Driver *et al.,* 2012). However, the location of wetlands poses a problem, particularly if they fall on private land (Cadman *et al.,* 2010). In some cases, offsetting wetlands becomes an option when the benefits of using the land for other purposes outweigh the existence of a wetland (Driver *et al.,* 2012).

3.6.2 Wise-use of the remaining wetlands

The Ramsar Convention defines the wise-use of wetlands as the process of sustaining the ecological character of wetlands through adoption of ecosystem-based approaches driven by the sustainable development principles (Ramsar Convention Secretariat, 2010a). Wetlands can resist alteration (Ramsar Convention Secretariat, 2015) Wetlands utilisation needs proper planning that takes into consideration circumstances of all the affected parties as well as empowerment of landowners, through focused training and though learning programmes for the management of wetlands. This must be enhanced by co-operation with other relevant parties including non-government institutions and community structures (Millennium Ecosystem Assessment, 2005). Apart from legislation, South Africa has other existing programmes supported by both the private and public institutions such as the Mondi Wetland Programme. These are helping to safeguard, rehabilitate and restore degraded wetlands. Many of these programmes support the management of wetlands as well as the livelihoods of the surrounding communities e.g., the Working for Wetlands Programme.

3.6.3 Restoration of degraded wetlands

Many wetlands have suffered conversion into other land uses, particularly agriculture, which is an international problem dating as far back as the mid- to late 20th century (Calhoun *et al.,* 2016). This is despite their unparalleled contribution to the ecosystem services from their small representation across the world. The Ramsar Convention requires that where there is potential to recover wetlands, efforts must be put into place to restore them (Ramsar Convention Secretariat, 2010a). The Ramsar Convention Secretariat (2010) states that there are many internationally supported programmes that aim to restore damaged or degraded wetlands. The decision to restore degraded wetlands must be informed by correct technical information, scientific evidence and proper planning to avoid investing in wetlands with no potential for recovery (Rebelo *et al.,* 2009).

In 2002, South Africa's government took a bold decision to address the decline of wetlands with the launch of the Working for Wetlands Programme, which promoted sustainable utilisation and rehabilitation of wetlands. Restoration is done through the creation of jobs, training and capacity development for wetland managers and landowners, as well as community empowerment through entrepreneurs and the selling of goods and services provided by wetlands (Cadman *et al.* 2010).

3.6.4 Mobilisation of financial resources

Financial resources to protect wetlands remain limited. This applies in both the international and local contexts, becoming worse when looking specifically within poor and developing countries (Pittock *et al.*, 2015). Countries need to invent innovative models for sustainable finance to ensure that they do the best with the little financial resources that they have (Herr, 2015).

In South Africa, wetlands are often found in locations suitable for other uses with rich economic opportunities, such as coal and other mineral deposits. This is very common in the grassland biome which has some of the most threatened ecosystems, including wetlands (GDARD & SANBI, 2013). The grasslands biome has large deposits of coal and areas of productive agricultural land, which generate money that could be invested back into the management of natural resources. South Africa continues to benefit from non-government funding (Cadman *et al.* 2010), including international and local donor funders who invest in projects aimed at managing wetlands. This has resulted in enormous improvements in how wetlands are utilised, viewed and protected by general society.

3.6.5 Education and empowerment of landowners and communities

There must be a dedicated programme to empower landowners to the wise-use and protection of wetlands (Ramsar Convention Secretariat, 2012). There must also be recognition of traditional values and customs built around sustainable management and the utilisation of wetlands (Ramsar Convention Secretariat, 2010b). Both formal and informal education must be used to empower landowners and encourage them to pass this knowledge from generation to generation.

South Africa promotes sustainable utilisation and management of wetlands through educational programmes, amongst others, which address a range of issues linked to wetlands loss (Cadman *et al.*, 2010). Cadman *et al.* (2010) further state that this has enabled people to understand wetlands much better than previously. In some cases, communities and landowners already have indigenous knowledge that they use to promote sustainable utilisation of wetlands.

3.7 Participation of landowners in wetland management

The protection of biodiversity and its associated ecosystems dates as far back as 1872 when the first protected area was declared in Yellowstone, United States of America. The declaration of Yellowstone National Park was the responsibility of the government authority and was never linked to the livelihood of the local people (Andrade & Rhodes, 2012). This declaration and its procedures, have led to the contemporary form of biodiversity protection across the world. Globally, protected areas are characterised by authoritative boundaries such as fences (Borrini-Feyerabend, Kothari & Oviedo, 2004).

It is an international requirement to have the participation of land owners or communities in the establishment of protected areas. According to Andrade & Rhodes (2012), there is a need to consider aspects such as the social, cultural and political issues of local communities in the establishment of protected areas. It is important that communities are allowed access to natural resources for their survival. However, if the access is not controlled or regulated, the natural resources may be exhausted to extinction (Bob & Bronkhorst, 2010).

To prevent negative attitudes towards protected areas, communities that host these sites should be considered as key stakeholders (Niedziałkowski, Paavola & Jędrzejewska, 2012). Niedziałkowski *et al.* (2012) added that these communities should be involved in decision-making at all levels, to prevent future undemocratic decisions that may result in communities fighting over the land. In countries where there is a history of forced removals due to political inequality, such as in South Africa, a conscious and sensitive decision should always take precedence.

3.8 Biodiversity decline, current status and effects on wetland ecosystems

According to the United Nations (1992) the Convention on Biological Diversity defines biodiversity as "the inclusivity amongst living and non-living organisms found in terrestrial, marine and other related aquatic environments and their complex ecosystems". Biodiversity decline is a global concern, and efforts to halt this decline face enormous challenges across the world (Secretariat of the Convention on Biological Diversity, 2014). The threat to biodiversity is no longer limited to specific countries, but it has become a global problem (United Nations, 1992). Since the adoption of the Convention on Biological Diversity, countries have set different targets to protect critical biodiversity (Secretariat of the Convention on Biological Diversity, 2014). The Convention leads the commitment towards

the conservation of biodiversity by more than 190 parties (Secretariat of the Convention on Biological Diversity, 2014).

The decline in biodiversity is quantified in terms of loss of genes, species and ecosystems, which are the main components of biodiversity (United Nations, 1992). The United Nations (1992) adds that the continued pressure is viewed by experts as a trend that will have catastrophic effects in a long term. This was supported by Ellis (2013) who claimed that these experts admit that the conservation of biodiversity must consider other equally important developmental needs. This is because biodiversity is seen as a hindrance in development, as strict protection of biodiversity can prevent access to water, land and the broad utilisation of natural resources (Ellis, 2013). Thus, global communities have switched from the strict protection of biodiversity, to the management outside the boundaries of protected areas. This presented a new challenge as the traditional management of biodiversity was narrow and never linked to other systems. Historically, ecosystems were protected because there was enough land or no one would be impeded by their declaration (United Nations, 1992).

South Africa is not immune to the decline in biodiversity. The country is a signatory to both international and regional obligations aimed at consolidating efforts to conserve biodiversity. The country became party to the Convention on Biological Diversity in 1995, and since then, good progress has been made in the management of biodiversity through the formalisation of dedicated institutions, laws and creation of equitable access to biodiversity resources with sustainable utilisation. However, South Africa's biodiversity conservation efforts are still competing with mining and infrastructure development, urban expansion, deforestation; illegal-hunting, greenhouse gas emissions, pollution and poverty (Cadman *et al*., 2010). These activities affect the ecological and evolutionary systems that are critical in the functionality and integrity of biodiversity and its associated ecosystems (Driver *et al.*, 2012).

3.9 Protected Area systems for securing critical biodiversity and ecosystems

The International Union of Conservation of Nature defines a protected area as "*a geographical area established, committed and managed through a legal or related means for an agreed term of protection for the purpose of conservation of resources and ecosystems within it*" (Dudley, 2008, p. 8). The international process of expanding a network of protected areas is guided by the Programme of Work on Protected Areas which requires a stakeholder-driven process, centred on ecological representation nationally, regionally and across boundaries (Secretariat of the Convention on Biological Diversity, 2012a). The Programme

of Work on Protected Areas was set up following the seventh Conference of Parties to the Convention on Biological Diversity held in Kuala Lumpur, Malaysia in 2004. It was further noted that the Convention agreed on four critical areas of intervention to help parties set realistic goals for the establishment and management of ecologically viable protected areas (Secretariat of the Convention on Biological Diversity, 2004). These four areas were:

i. The development of practical and direct measures in the selection, prioritisation, enhancement and co-ordination of systems for protected areas.

ii. The establishment of a sound system for governance backed by broad participation and equity considerations.

iii. The creation of an enabling environment for all sectors that have a role to play. This includes capacity development and mobilisation for both human and financial resources.

iv. Regular monitoring and reporting of the progress made and adoption of measures taken to improve effectiveness of the system.

The establishment of a network of protected areas is one of the most secure ways of reducing the rate of biodiversity loss. South Africa has set targets of critical biodiversity to be protected. The expansion of protection of important ecosystems and biodiversity is guided by the National Protected Area Expansion Strategy, which was published in 2008. This strategy defines a protected area as any peace or part of the land or sea that is secured leagally for the purpose of conserving biodiversity (Government of South Africa, 2010) The strategy is driven by the Protected Areas Act which intends protected areas to be sites safeguarding, amongst other things, plant and animal species, wetlands, water, ecosystems and other aspects of biodiversity.

The strategy set a 20-year target for the expansion of terrestrial and marine protected areas. This included protection of the terrestrial ecosystems, marine in-shore and marine off-shore (Government of South Africa, 2010). These targets were broken down into phases to ensure realistic efforts were put in place whilst taking note of the broader socio-political circumstances of the country. The Department of Environmental Affairs and partners have since worked on the second version of this strategy which undergoing the ministerial approval process.

3.10 Protected areas establishment with stakeholders

Conservation of biodiversity is no longer the sole responsibility of environmental authorities (Shivakoti, & Shivakoti, 2008). There should be sector co-operation on policies and programmes for the conservation of biological diversity, as required by the Convention on Biological Diversity (Hesselink, Goldstein, van Kempen, Garnett and Dela, 2007). The concept of 'stakeholdership' is not new in the conservation sector – the introduction and recognition of stakeholder's dates back as far as the early 1980s when there was a strong consideration of the integrated management of natural resources (Young, Jordan, Searle, Butler, Chapman, Simmons & Watt, 2013). Since then, many countries have integrated recognition of stakeholders into their environmental policies and legislation (Reed *et al*., 2009).

Stakeholders are individuals or entities who are interested or affected by an action, or those who are more likely to be the immediate recipients of changes from the introduction of new policies (World Wide Fund for Nature, 2000; Hesselink *et al.*, 2007). Stakeholders are not only single individuals; they are also organisations, institutions or civil societies that have the same interests. When more than one set of stakeholders is involved, it is known as a multi-stakeholder process (Achyar, Schmidt-Vogt & Shivakoti, 2015). Stakeholders vary with sectors of society. The interpretation of stakeholders in the business sector is not the same in the conservation sector. Establishing a good network of stakeholders and platform of engagement for a project or initiative brings many benefits (Aggestam, 2014). There are three common forms of stakeholders namely primary, secondary and tertiary stakeholders as discussed below:

3.10.1. Primary stakeholders: local residents

These are the immediate recipients of the actions, changes or introduction of a phenomenon, including institutions or individual people (Hesselink *et al.*, 2007). Primary stakeholders can also be those who give approval or permission to remove or protect a species such as ministries or heads of departments (Ansong & Røskaft (2011).

In establishing protected areas, there is a need to recognise communities adjacent to the site to be protected, and such recognition should focus on their subsistence and wellbeing (Lai, 2003). Some communities have social groupings that are bigger and more influential than

others, and this must be considered when working with communities around protected sites (Maretti, 2003).

Central to the sustainability of democracy, is the active participation of citizens to influence decisions, provide input, planning, and provide guidance where needed. This could be through voluntary or legislative means (Reitzes, 2009). Community refers to a group of people from various origins sharing the same social artefacts, ties, common perspectives, and who have regular engagements within the same geographical locations or settings. Local communities are influenced and shaped by their circumstances or surroundings (Green & Mercer, 2001). According to Reitzes (2009) community participation refers to the active involvement of members of the community in the actions and decision-making about a proposed policy, circumstance or predicted change that will affect their lives. Community participation has become a critical process in the governance systems of many countries with democracy. In South Africa, community participation has been made a requirement of any decision in the government (Mashamaite, 2014).

South Africa's system of establishing protected areas has resulted in many losing residential land, displacement, disruptions to farming, health hazards, and potentially hurtful consequences (Synman, 2014). It must be noted that participation differs from place to place and it is influenced by various aspects (Reitzes, 2009). History shows that communities were able to manage their natural resources with very little or without government intervention (Bob & Bronkhorst, 2010). In some cases, commonly in African countries, only community or traditional leaders were there to assist with compliance and monitoring of people's behaviour towards natural resources. However, the participation of citizens in the management of natural resources has since become more contentious. Poverty, inequality and colonisation are believed to be the reasons behind the failing effort to conserve the limited natural resources such as biodiversity and its associated ecosystems (Roe, Nelson & Sandbrook, 2009).

3.10.2 Secondary stakeholders: governments

These are the entities that are one step removed from the actions, changes or introduction of a phenomenon (Hesselink *et al.*, 2007). These stakeholders may or may not be involved in the collaboration, but they complement primary stakeholders (World Wide Fund for Nature, 2000). Sometimes they hold authority for governance.

Across the world, many established protected areas are the responsibility of the national government, national conservation agencies, provincial conservation authorities, charitable trusts, communities or private individuals (Shivakoti & Shivakoti, 2008). It is important to note that the management of protected areas differs with the scale of resources to be conserved, and from country to country.

3.10.3 Tertiary stakeholders: research institutions and non-government organisations

The tertiary stakeholders are those stakeholders who neither benefit, nor lose, but who have a role in the process, action or phenomenon (Hesselink *et al.*, 2007). They are regarded as neutral to the case or phenomenon taking place, but their participation can be either positive or negative (Aapaoja & Haapasalo, 2014). Aapaoja & Haapasalo (2014) added that tertiary stakeholders are important in the functioning of partnerships, but do not have a final decision. Their decisions are always a subject of engagement and consensus. They are strong when they work in collaboration with other stakeholders. They are mostly well-resourced in terms of both finances and expertise.

3.11 Forms of participation by stakeholders

Any individuals or institutions interested or affected by the proclamation of protected areas are allowed to make verbal or written representation for consideration before the decision is made. However, the participation by affected parties is dependent on the issue at hand (Jha, Barenstein, Phelps, Pittet & Sena, 2010). Jha *et al.* (2010) compiled a list of types of participation (as was detailed in the Active Learning Network for Accountability and Performance in Humanitarian, 2003):

i. Participation through local initiatives

This participation occurs when communities run initiatives aimed at supporting the common vision of the project proposed. It is generally the most widely used form of participation in many communities. It is, however, challenging to working community members as this requires them to be physically present at meetings.

ii. Interactive participation

This is largely run by organisations or institutions with authority. It is common when there is a proposed plan of change. It allows every resident to have their voice. They can respond in the form of comments, suggestion or messages of support. It is less labour intensive and is most effective in urban setups where people are assumed to be busy.

iii. Support/aid-based participation

There are those citizens who would prefer to make their pledge towards an initiative of common cause. They do not want to be actively involved. This participation involves the provision of items, materials or money. Most of the people involved are from the business sector or large corporate organisations. Their contribution is also influenced by the effect that the contribution will have on their public image and tax rebates.

iv. Participation through consultation

There are some participants who have more knowledge of certain things than others. Some community members volunteer to provide advice because they have expertise.

v. Passive participation

As communities are not uniform, some participants only want to be informed about everything that is happening, without being involved. They normally follow those participants who are active and willing to influence.

3.12 Factors to consider when identifying stakeholders for protected areas

3.12.1 Land ownership and rights

Access to land and biodiversity conservation are two issues that need to be addressed together because they contribute to the livelihood, existence and sense of belonging to many indigenous people (Springer & Almeida, 2015). According to RAC/SPA and IUCN-Med (2013), there is a need to understand and be familiar with the land owners before the establishment of protected areas. Considering the socio-economic status of landowners helps to minimise risks to the sites from people who would want to use protected resources (RAC/SPA and IUCN-Med, 2013). For example, in areas where the land owners are hunters, one has to find a better alternative to reduce the risk of poaching or illegal harvest of natural resources in the protected areas. Landowners feel valued when their rights and access to land are embraced and supported when entering into co-management of protected areas (Springer & Almeida, 2015). Landowners must always be recognised and included in the decision-making about the protection of resources (RAC/SPA & UNEP/MAP, 2013). Where necessary, their views must take precedence and be sustained with honesty, including their expertise, skills and knowledge. The objectives of landowners and those of the government authorities are not always the same. These differences call for alignment of objectives

between landowners and protected area management to promote stability and minimize risks of communities feeling undermined (RAC/SPA & UNEP/MAP, 2013).

3.12.2 Respond to national and international calls for biodiversity conservation

Springer & Almeida (2015) have called for international organisations responsible for conservation of biodiversity to also integrate a rights-based approach, since biodiversity is part of the indigenous people's land. Whether the site to be protected is small or big, the objective should be to protect and sustain its biodiversity and to also help the country to respond to international calls (RAC/SPA & UNEP/MAP, 2013).

Protected areas must have suitable governing bodies that are representative of the affected parties (Dudley, 2008). The current generation carries a moral obligation to ensure that species of fauna and flora are sustained for the next generation (Dudley, 2008). The composition of the management of protected areas should outline how decisions are made, how stakeholders are consulted and how their inputs are integrated (Lockwood, 2010). According to Dudley (2008) the International Union of Conservation of Nature (IUCN) calls for all newly established protected areas to adhere to principles of good governance in relation to indigenous or local communities through:

- The consideration of the rights of the local landowners in the establishment of protected areas.
- Recognition of the indigenous and customary laws of the indigenous or local landowners.
- The maintenance of the custodianship of the land held by local communities.

All these principles adhere to the Convention on Biological Diversity's Programme of Work on Protected Areas, and the United Nation's extension of declaration in the recognition of the rights of indigenous people in relation to the management of protected areas (Dudley, 2008).

In South Africa, the Protected Areas Act requires the establishment of protected areas to be in line with the statutory requirements as set out in the national, provincial and localised council statutes (Driver *et al.*, 2012). Respect must be given to the occupants of the land and their socio-economic upliftment, as well as biodiversity conservation (Driver *et al.*, 2012). The Act requires indigenous landowners to be recognised as valuable partners in the establishment of protected areas (Driver *et al.*, 2012).

3.13 Conclusion

There is a variety of research conducted domestically and across the globe looking at ways to protect or improve the status of wetlands. Much of this research has a narrow focus to understand explicit details of the status of wetlands. Topics of research include the provision of data and inventory, co-management, mobilisation of resources and capacity development. The participation of local community members also needs special attention. Some countries are better than others in adopting the best practice in the management and expansion of protected areas for safeguarding biodiversity. This study will also use previous research as an opportunity to identify points of interest to policy and decision-makers in the expansion of the protected areas to conserve wetlands.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

The main purpose of this chapter is to explain the procedure followed to examine the role of each stakeholder in the Colbyn Valley Wetland. It provides the basis upon which the questionnaire was structured to collect the data from all participants, including how the integrity of the data collected was maintained. It gives information on ethical considerations made during the course of the case study, as well as highlighting the limitations of the methods and steps that were undertaken to address them. The chapter further introduces why this case study was selected and the research questions that were critical in the selection of the case study.

4.2 Research design

Research design is the process of planning and guiding the overall study, including the sources of the required data (O'Sullivan, Rassel & Berner, 2008). O'Sullivan *et al.* (2008) further add that every research investigation demands a design that suits the conditions of the study. These conditions are influenced by the existing research problem as well as the set of questions to be answered. This research is a case study aimed at investigating, profiling and assessing the role played by multiple stakeholders in ensuring the Colbyn Valley Wetland was protected. The case study further assesses the effectiveness of each stakeholder in the process, including post-declaration. The data used in this case study was sourced from all the stakeholders involved in the proclamation and management of Colbyn Valley Wetland. It considered written, archived and verbal information relating to the roles played by each stakeholder involved.

Case studies are an opportunity to get first-hand experience of an existing problem, evidence of decisions, or conclusions about the situation (Mack, Woodsong, Macqueen, Guest & Namey, 2005). Mack *et al*. (2005) further states that this can be used as evidence to approve or disapprove a decision. Case studies have become a reliable basis upon which policies are made, since they have a real-life story. They normally have a geographical or political jurisdiction to which the problem in question exists (Nishishiba, Jones & Kraner, 2013). A sample of participants is normally identified in relation to their role in the research problem or the impacts the problem has had in their lives (McNabb, 2013).

4.3 Research methodology

According to McNabb (2013), there are three common types of research methods: qualitative, quantitative and mixed method. Historically, the quantitative research design was the preferred method in the physical or natural sciences, whilst the qualitative method was preferred in the human and social sciences. There was a need to bridge the gap between the two methods which was how the mixed-research method was introduced. The mixed-research method allows any available resource of evidence to be used (McNabb, 2013). This includes written, podcast, visuals of events such as photographs and videos, as well as statistical evidence.

This case study has adopted the mixed-research method to utilise both the descriptive and numerical data collated from the participants. The primary stakeholders were given a closed-ended in-depth questionnaire, whilst the secondary and tertiary stakeholders were given a semi-structured in-depth questionnaire. This is because primary stakeholders included a large group of individuals, while the secondary and tertiary stakeholders represented single institutions. As noted from Pascal (2006), this case study has ensured that the process of collating data was driven by quality during collection, recording and maintenance of data. This was to ensure that there was an honest interpretation, reflection and presentation of the results (Pascal, 2006).

4.3.1 Primary stakeholders

This case study referred to local residents as the primary stakeholders because they initiated the call for the protection of Colbyn Valley Wetland consistently over two decades. The Protected Areas Act requires responsible authorities to initiate mobilisation for the support from relevant parties to protect identified important biodiversity. The Act however does not prevent any other person or parties from initiating the process to protect the biodiversity. The call to protect Colbyn Valley Wetland by local residents meant they were willing to give away an opportunity to have land development, which would have had the potential of creating jobs and bringing services closer to the people.

The local residents were initially objecting to development in the Colbyn Valley Wetland individually, without any co-ordinated efforts, until the formation of the FoCV group (FoCV). The formation of FoCV happened after the dissolution of the now defunct Friends of Colbyn group, which had the related objective of bringing the local residents together.

However, these two organisations never had a direct relationship. The questionnaire was directed to each local resident who is part of the FoCV, to respond to questions individually on why they supported the protection of Colbyn Valley Wetland. This was to ensure every view about the Colbyn Valley Wetland from the local residents was considered.

The primary data was collected through a questionnaire just a year (mid 2015) after the proclamation of the site as a nature reserve, which took place mid-2014. The participants from the in FoCV were reached through the mailing list as well as through physical delivery at the address suitable to the participants who have no e-mail access. No participant was forced to respond, and all participation in the questionnaire was voluntary. The participants were all afforded an opportunity to understand the purpose of conducting the case study, as well as reminding them about their right of participation.

The access to the FoCV was enabled by the secretary of the group a month before the collection of data was begun in 2015. The secretary did not allow direct access to the mailing list since she was the only person authorised and entrusted with members contact information. There were 26 responses received from the e-mail and the physical submission.

4.3.2 Secondary stakeholders

Secondary stakeholders refer to the authorised institution with the legal responsibility of protecting biodiversity and ecosystems in terms of the Protected Areas Act. This Act requires that technically sound evidence is required if the identified important biodiversity and associated ecosystem is to be protected and the form that the protection takes. The Act further requires that affected landowners and local residents are consulted before the declaration process is initiated.

The institution authorised to protect any biodiversity and associated ecosystems in the case of the Colbyn Valley Wetland is the Gauteng Department of Agriculture and Rural Development (GDARD). This department works closely with various other departments as well as the City of Tshwane Metropolitan Municipality, which remains the custodian of the land upon which Colbyn Valley Wetland is located. The department provided a representative to respond to all the questions on behalf of the department. The representative of GDARD had to seek approval of participation from the department, which was approved in the beginning of 2017, before participation in the study in May 2017. This representative had sufficient knowledge of the Colbyn Valley Wetland and was involved in every step of the

process followed to declare it a nature reserve. The representative received a semi-structured, in-depth questionnaire. It must be noted that the City of Tshwane refused to participate since they believe the declaration process was in the provincial minister's authority and as the municipality all they wanted was to see the site protected. it is for this reason that the GDARD was engaged directly.

4.3.3 Tertiary stakeholders

The Colbyn Valley Wetland also had organisations that were supportive of the protection of the wetland without necessarily having authority or an obligation to do so. These institutions included non-government organisations, higher learning institutions and local businesses. These organisations are referred to as tertiary stakeholders. These organisations wield influence as they provide resources such as finances and human capacity to help with the management of the wetlands. Their influence cannot be ignored since it is public knowledge that government is always stretched financially and has limited human capacity.

In this case study, these institutions were represented by the Agricultural Research Council (ARC), which volunteered its support to the wetland and the FoCV. The representative responded to the questionnaire voluntarily and gave perspectives about their relationship with other stakeholders involved. The intention was to reach a number of tertiary stakeholders, but no response was received from the other institutions.

4.4 Ethics and ethical issues:

In research studies, ethics relate to the consistent application of morals when collating and interpreting data, as well as when presenting results (McNabb, 2013). This research study has undertaken to abide by the expected moral standards required by the University Council (University of South Africa) and by the research participants. The researcher committed to ensuring that data were collated and used in the most responsible manner and abided by the rules and regulation of the Republic of South Africa. There was also a consideration of international best practice in ensuring the data collected was of the highest quality. The UNISA ethics approval number is: 2016/CAES/108 (see Appendix 3).

This case study further sought the written approval from selected participants. Those who represented institutions (secondary and tertiary data sources) also sought approval from their respective institutions. All the participants were told about the purpose of the study and the intended results. The participants participated voluntarily. There were neither favours nor

promises made to the participants. This case study ensured all necessary authorisations were sought with the respective parties to maintain the integrity of the study. The participants were familiarised with the contents of the questionnaire before attempting to respond. The data collected were only intended for this study. This process was necessary to ensure the study respected the business conduct of the participating institutions.

The study was conducted with highest degree of professionalism, accuracy and respect for participants. The data was collected without any bias towards religion, gender, sexuality, race and culture. The reporting procedures were explained for any unfortunate and regrettable incidents. The study supervisor also provided her contact information for all participants to reach her with ease.

4.5 Research questions and the consistency matrix

The main purpose of the consistency matrix is to ensure there is coherence in the research questions that the study seeks to answer by broadly taking into consideration other key components of the whole research (Table 4.1).

Table 4.1: Consistency matrix.

Research questions	Information gathered by
What are the key factors attracting stakeholders to the wetland?	Inclusion of questions about features found in the wetland e.g.: • What aspects of this nature reserve appeal to your institution?
What is the role of each stakeholder in the protection of the Colbyn Valley Wetland?	Inclusion of value-focused questions to stakeholders in the questionnaire, e.g.: • What is your role in the nature reserve?
What is enabling this partnership of stakeholders in the protection of the wetland?	Review of stakeholders' future plans for the Colbyn Valley Wetland, e.g.: How do you think your institution is able to fulfil the commitment on the conservation of biological resources?
Are there any returns on investment for these stakeholders?	Analysis of the relationship amongst stakeholders with the Colbyn Valley Nature Reserve e.g.: • What is the contribution of this nature reserve to your business? E.g. increased your biodiversity targets, tax remission or any other aspect?
What transferable lessons have been learnt from the Colbyn Valley Wetland Nature Reserve and its stakeholders?	Inclusion of questions that will allow all the lessons learnt during the study to be documented properly for public consideration, e.g.: • What else do you think needs to be done in this nature reserve?

4.6 Data collection

The case study has two sources of data: primary and secondary. The primary data were collected from the questionnaires of the three stakeholder groups: primary, secondary and tertiary. The secondary data were generated from the existing information about the Colbyn Valley Wetland and its surrounding local residents, as well as Statistics South Africa (2016).

4.6.1 Primary data collection

The primary data was collected through an closed-ended questionnaire that was sent to the primary stakeholders or local residents and the semi-structured questionnaire that was sent to the secondary and tertiary stakeholders. The details of which are explained below:

i. Closed-ended questionnaire for primary stakeholders

The purpose of this questionnaire was to allow the members of the FoCV to reveal more information about their relationship with the Colbyn Valley Wetland. The questionnaire included questions focusing on various factors such as the demographic profile, educational background, and societal classes of the participants. This formed part of quantitative data collection that was analysed independently. Qualitative data that was collected was based on the relationship that the FoCV have with the nature reserve. The questionnaire was delivered both by hand and electronically to all the participants in the period between 2015 to 2017. Participants completed the questionnaire as individuals. The target was to receive a response from all members of the FoCV group. Some participants were willing to give more than what was asked in the questionnaire, and these responses were recorded and relevant information had been considered.

ii. Semi-structured in-depth questionnaires for secondary and tertiary stakeholders

The second questionnaire used was a semi-structured, in-depth questionnaire aimed at the secondary and tertiary stakeholders. This form of questionnaire allowed the two participants to express themselves fully without being limited by the expectations of the researcher. They were provided with an option to give details about their role in processes leading up to the declaration of the nature reserve and its management after declaration.

Written interviews were conducted with one representative each from secondary (government) and tertiary stakeholders (other non-government organisations or research institutions). This type of interview allows intense assessment of an institutions' views on the given proposal, project or perspective (Boyce & Neale, 2006). Written interviews are often used in qualitative research and give participants an opportunity to expand their responses to questions posed (Bradley & Harrel, 2009). In this study, participants were giving their views on behalf of their institutions. This case study respected the various institutional procedures for input by institutions such as government departments.

4.6.2 Secondary data sources

Secondary data refers to data collected for other purposes, by other entities, but still relevant to the current research (Tripathy, 2013). This type of data provides balance of perspective between what is provided from the participants and what already exists. Much of the secondary data used in this study forms part of the technical information that was used in the process to declare the nature reserve. Some of the information was housed in the municipality, and other information was housed at the provincial and national government. This case study consulted the following sources as its secondary data:

i. City of Tshwane Vision 2055 adopted in 2013 by the city council

The main purpose of the City of Tshwane Vision 2055 has been to guide the city's broad developmental agenda through strategic interventions, and lead to informed decision-making processes within the next four decades. The City of Tshwane further added that this vision is intended to guide the city council with respect to the city's Spatial Development Plan and Integrated Development Plan. This involves mobilising civil society, communities and business in terms of planning, prioritisation and implementation of programmes for development. One of the critical outcomes of this vision is to ensure the city utilises its natural resources in a manner that is responsive to the challenges of poverty, inequality and unemployment, while enhancing socio-economic development and spatial transformation of the city (City of Tshwane, 2013b). The Vision 2055 document helped to understand the city's interest towards their natural resources in general, as well as its level of effort, investment and commitment to the Colbyn Valley Wetland.

ii. Biodiversity Geographic Information Systems (BGIS)

The Biodiversity Geographic Information Systems (known as BGIS; http://bgis.sanbi.org/) is managed by the South African National Biodiversity Institute (currently in partnership with the University of the Western Cape) (SANBI, 2016). This website disseminates biodiversity datasets and conservation plans in South Africa (SANBI, 2016). It is a reliable source of spatial biodiversity datasets relevant to the City of Tshwane and Colbyn Valley Wetland Nature Reserve.

iii. Statistics South Africa

Statistics South Africa (Stats SA) is the "national statistics agency of South Africa established under the Statistics Act [Act 6 of 1999] with the overall aim of producing, timeous, accurate and easily accessible official statistics" (Stats SA, 2016). In this case study,

Stats SA provided background information about the study area and its surrounding residents. It further gave information on the socio-economic status of local residents and key factors that shape their lives. Stats SA was not the only source of demographic information, and this case study also consulted other sources, such as the Research and Innovation component of the City of Tshwane and many others when necessary.

4.7 Data analysis

The primary objective of analysing data is to obtain information that can be interpreted and used meaningfully (McNabb, 2013). The process of analysing data involves establishment of relationships between different variables to predict outcomes, as well as find a conclusive summary for the data. This case study was characterised by variables that could not be measured with numbers, but could be described or observed, such as the admiration of the value of biodiversity that lies within the nature reserve. Other variables were quantifiable, such as the number of people living around the nature reserve.

The numerical data generated from the questionnaire with all stakeholder types were captured and recorded in a spreadsheet. The spreadsheet allowed for the conversion of this data into various illustrative figures compatible with numerical data such as pie charts and graphs. The descriptive data were interpreted by categorising and assessing the textual information, without any alterations.

The closed-ended questionnaire was interpreted within the context of legal principles for protecting sites for conservation purposes and the inclusion of other interested parties in the management of the sites.

The descriptive data was generated through extraction of direct responses from the participants. These responses were then grouped into themes for better understanding and contextualization. Where necessary, some text was extracted as direct quotations without explanation, since their meaning was explicitly clear to understand.

The data was also collected from semi-structured questionnaires that were targeted to the secondary and tertiary stakeholders. The data from these participants was both descriptive and numeric. The data was strictly about stakeholders' role in relation to the wetland and the need to secure wetlands ecosystems.

4.8 Reliability and validity

Reliability in research refers to the extent to which the same test can be repeated and yield the same results. This case study has committed to ensuring that all measures are in place to maintain consistency in the analysis of data. Any identified errors related to the data, particularly participant's inability to engage fully with the questionnaire, was dealt with immediately (Golafshani, 2003). The study also used test standards from the latest literature on the management of data from questionnaires.

Validity refers to the ability of the selected test instruments to measure the variables (Golafshani, 2003). Validity involves the usage and access to credible sources of data. Data must always be collated from credible sources, using the correct standards and approved apparatus (Heale & Twycross, 2015). Given this, the questionnaire was only meant for participants with a proper background understanding about the wetlands. Participants were required to have an understanding of how the wetland became a nature reserve after many years of lobbying. It is for this reason that representatives from GDARD and the City of Tshwane who were not part of the stakeholders before proclamation of the site as a nature reserve were not allowed to participate. Participants were informed of how their feedback was going to be used and the implications thereof. This was highlighted verbally before the questionnaire was handed over and was stated in the introduction of the questionnaire. This was to avoid jeopardising the study with unexpected risks. Besides the contact with stakeholders through a questionnaire, the study also used existing literature about management of wetlands particularly at a national and international scale. The information sourced from government documents has been approved and audited by government (and related institutions) before release to the public.

4.9 Limitations

This study has several limitations, particularly the sampling of only one institution in the secondary and tertiary stakeholders as opposed to many responses from the primary stakeholders. This could be attributed to the criteria set for secondary and tertiary stakeholders to have had been involved in the wetland before declaration as nature reserve and post-declaration. There was only one willing participant from the secondary and tertiary stakeholder groups. The case study was also reliant on a self-completed questionnaire, wherein participants may give incorrect information with no oversight. Not having access to the full mailing list of the FoCV may have excluded some useful responses. Some

participants wished to answer in person, but scheduling difficulties meant that this was not possible.

To ensure the study findings are valid in the face of limitations, the study ensured that primary stakeholder participants were registered members of the FoCV so that their feedback can be traced back to their membership should any controversy arise. The secondary and tertiary stakeholders where asked to ensure they got approval from their employers before they participate in the questionnaire. This ensures that all the feedback they provide is authorised by their respective institutions.

4.10 Conclusion

In conclusion, the primary data were collected through questionnaires, and secondary data were sourced from a variety of publicly available repositories and documents. The collection of data has also followed variety of university (University of South Africa) set ethics and compliance standards for undertaking a research with the participation of human beings. This included acknowledgement of all sources that were considered in the secondary data and seeking prior authorisation from various sources that requires permission.

CHAPTER 5: RESULTS

5.1 Introduction

This chapter presents the results from the questionnaires conducted with the three stakeholder groups (primary, secondary, and tertiary). This case study was intended to investigate the key drivers of multiple stakeholder participation in the process leading up to the protection of Colbyn Valley Wetland as well as the role of these stakeholders after the declaration.

5.2 Primary stakeholders: local residents

This section presents the views of the local residents, which they shared through the questionnaire. The general profile of the participants is presented, as well as direct quotes from the respondents.

5.2.1 Demographic and socio-economic profile of the primary stakeholders

The demographic analysis revealed that 62% of the respondents from primary stakeholders were women, and 35% were men. The remaining 3% of the participants chose not to reveal their gender. The questionnaire also revealed that 58% of the participants stated English as their preferred language. Although English was the preferred form of communication during the questionnaire, some participants were multilingual and able to speak in Afrikaans or other languages.

The demographic analysis further revealed that 88% of the primary stakeholder participants were white, whilst the coloured participants comprised 4%. The remaining 8% chose not to reveal their race. The questionnaire found that 30% of the participants have at least a degree or diploma (Figure 5.1). This was followed by 23% of participants being in possession of an Honours degree, and a further 23% with either Masters or Doctoral degrees. The remaining 24% of the participants had a matric or lower qualification.

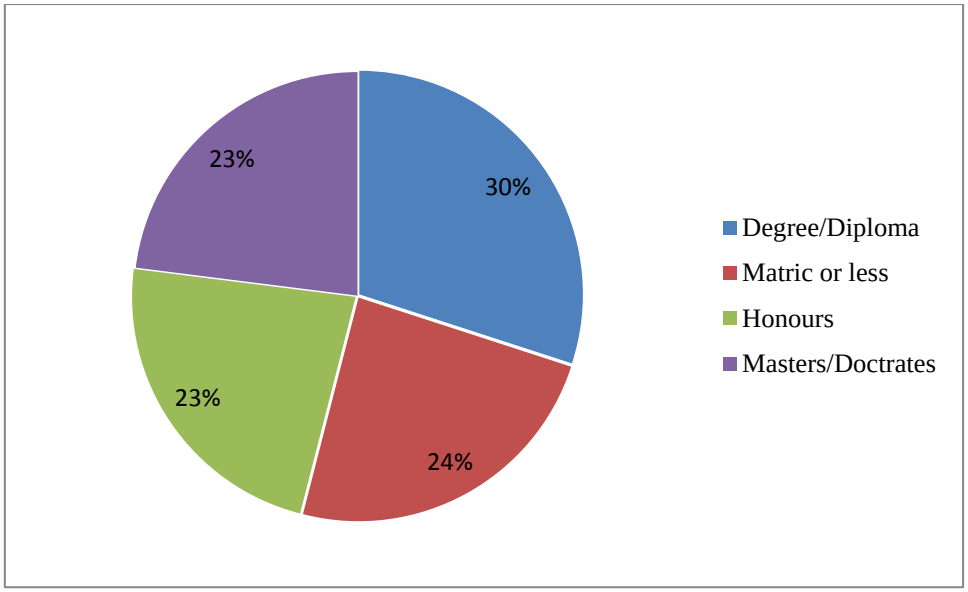


Figure 5.1: The classification of primary stakeholder respondents by education.

The questionnaire further found that 42% of this group hold professional jobs (Figure 5.2). The 30% of participants who were unemployed were mostly pensioners. The remaining 28% had jobs shared across manual labour, skilled labour or supervisory in various sectors. The participants represented both long-term residents of the area as well as new residents. The questionnaire indicated that 65% of the participants have been living in the suburbs surrounding the wetland for more than five years prior to the proclamation as a nature reserve.

In summary, most of the participants were white females, who spoke English, were educated and held professional positions. Most were long term residents of the area.

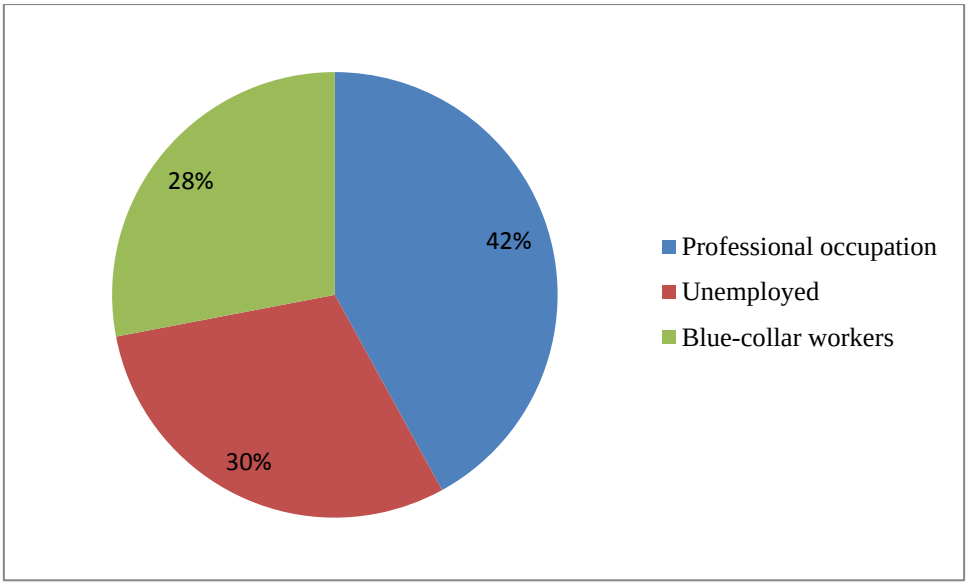


Figure 5.2: Occupations of the primary stakeholder respondents.

Some residents have been involved with the wetland and communities around it for more than two decades. Respondent six has lived in one of the suburbs around Colbyn Valley Wetland for 20 years, whilst Respondent eight has lived in the area for at least 30 years. The number of years living around the Colbyn Valley Wetland does not necessarily reflect the period of activism toward protecting the wetland, however. For example, in the case of Respondent 19, who was a passive member of other local "friends groups", only became actively involved in activities after joining FoCV.

During the Mandela Day clean up on 18 July 2015, the Secretary of FoCV, Tamsyn Sherwill, stated that the group is a democratic community: members vote their representatives into voluntary administrative positions and provide them with a mandate for a certain period of time. She further added that the constitution of the FoCV determines the length of stay in office as well as the behaviour and characteristics of the members. She has also emphasised that members must complete a membership form to be a registered member, which affords many choices for the type of affiliation.

5.2.2 The perspective of primary stakeholder on the Colbyn Valley Wetland

The primary stakeholders were asked if they supported the call for the protection of the Colbyn Valley Wetland, which they answered earnestly. One question asked the participants what value they see in the site and whether they provided support at any scale. Most participants supported the wetland primarily for environmental benefits (ecosystem goods

and service) and secondarily for community services. Environmental benefits are about protection of biodiversity and ecosystems for continued generation of goods and services (Driver *et al.,* 2012). Community service is driven by a personal wish to give volunteer services to the surrounding community for no personal gain (Blom, 2016). The two services were also influenced by the perceived socio-economic impact that the protection of Colbyn Valley Wetland would have, such as the prevention of environmental disaster risk, an increase in the value of built properties, and the improvement of the environmental outlook of the suburbs in general. The questionnaire found that 62% of respondents mentioned environmental benefits, while community service was mentioned by 19 % of the respondents. The remaining 19% of respondents did not respond to the question for unknown reasons.

The questionnaire led to the development of themes that then shaped the study as follows. According to the 26 participants from the primary stakeholders as reflected in the questionnaire, the protection of Colbyn Valley Wetland would ensure:

i. Safety for a threatened wetland ecosystem

The possibility that the wetland would be targeted for development triggered the primary stakeholders' decision not to wait for the responsible authorities to initiate the process to protect the Colbyn Valley Wetland (Sherwill, 2015). The competition for the land use was high, making it impossible for the wetland to survive without any form of protection. According to Respondent 23 there was a:

> *"…a huge sigh of relief that it would be more difficult for greedy and unscrupulous developers to get their hands on this valuable piece of real estate if it is a declared nature reserve".*

ii. Accessible natural open green spaces

The Colbyn Valley Wetland is surrounded by a number of private and municipally-owned open recreational parks, or green spaces, such as Colbyn Golf Park and the L.C. De Villiers Sports Venue. Many of these facilities have been transformed from the natural state of vegetation or wetland ecosystems to suit another purpose. The Colbyn Valley Wetland remains a pristine natural green space that is open to the public, which was the reason that some respondents chose to fight to protect the Colbyn Valley Wetland. According to Respondent 20*, "the fact that it is a large, relatively wild, open space near the city, railways and horses* [is good since I] *do not have to drive far to see nature"*.

iii. Birding

The Colbyn Valley Wetland remains a habitat for diverse species of birds (Sherwill, 2015). Like anywhere else, the removal of this wetland would force these birds to migrate elsewhere or to even become locally extinct. The loss of the wetland would affect the primary stakeholders' who appreciate birds. During the questionnaire Respondent 19 emphasised that:

> *"...as I live on the border of the* [nature] *reserve, it plays an important role in the quality of life – in the form of views and sightings (or even just the knowledge of the possibility of sightings) of interesting bird and other species".*

This was supported by Respondent 25 who claimed that, "*the fact that you can have a wetland on your doorstep and that it brings with it an array of birdlife".*

iv. Ecological support for the river catchment

The combination of the wetland, the peat and the stream that flows to the Roodeplaat Dam, which supplies water to parts of Pretoria, was recognised by Respondent 21. According to this respondent, the Colbyn Valley Wetland remains *"...an aquatic ecosystem in our area* [that contributes] *to cleaner drinking water* [in] *Pretoria".*

v. Centre for education and community empowerment

There were participants who felt very strongly about the opportunity to educate their children and instil in them a sense of appreciation for the natural wonders that exist within the nature reserve. According to Respondent 22 the Colbyn Valley Wetland provides, *"...the chance to be involved in a project that allows my child to learn social responsibility first hand".* Some respondents were able to link Colbyn Valley Wetland with surrounding social networks. Respondent 23 stated that*, "...its value as an entity on its own is worth protecting, but one should also consider educational value".*

Other respondents also used the nature reserve for the broad empowerment of children, particularly children who are less privileged. Respondent 18 claimed that the proclamation of the nature reserve helps her in:

> *"...teaching our children to protect.* [Participation in] *the water testing was the most informative, getting kids involved from orphanages, the books, dvds, poster that was handed out for future career paths*".

5.2.3 Responsibilities of primary stakeholder in the wetlands

The local community members provide various forms of support to the running of the Colbyn Valley Wetland. All the support offered has been voluntary, with no compensation given to the primary stakeholders. The questionnaire revealed that the support is from a personal capacity, as well as from a community-wide commitment to the wetland. There is no limit in the support that volunteers can give as long it aligns to the overall objective of sustaining the nature reserve. The role of primary stakeholders in the wetland includes:

i. Mobilisation of support for various activities and initiatives in the nature reserve

Respondent 19 served the nature reserve on a voluntary basis, particularly on *"initiating and organising of the activities of the FoCV group"*. The respondent further added that the voluntary service was triggered by the

> *"…threat of development (the parking garage proposal) on the border of the reserve, but* [I] *was also interested in learning more about the wetland and having the opportunity to be involved in its conservation, particularly as I live on the border of the reserve."*

Respondent two offered *"financial and clean up"* support because of the *"care for the environment".*

ii. Advancing a principled course of protecting the wetland

Some respondents to the questionnaire were aware of the risk of loss of critical biodiversity near their suburbs and the subsequent consequences. There is so much personal commitment that the local community members have invested in the Colbyn Valley Wetland. Respondent 23 said that:

> *"I follow the FoCV activities and contribute when I am able to; I was one of the first people to respond when the proposal to auction and possibly develop the area was advertised by the City of Tshwane a couple of years ago. I wrote a letter to the council as an interested and affected party to register my opposition to the proposed sale and development of the land. I keep an eye on such notices and always respond quickly when there is an attempt to develop a green area that needs protecting. I also share the information widely in order to drum up support such as letters to the council and signing of a petition when I come across it"*.

iii. Part of the broader network of environmental initiatives

Tshwane residents have various other community environmental initiatives, such as eco-clubs. Respondent 21 said that she "*was involved via Rationdale Primary School Eco-Club".* This is part of the eco-club initiatives that exists in the City of Tshwane. During the Mandela Day activities of 18 July 2015, the Secretary of FoCV, Tamsyn Sherwill, stated that Colbyn Valley Wetland is now part of the bigger "Friends of Nature Group" network that serves the interest of the various nature reserves across the City of Tshwane. She added that an affiliation with one group gives access to all other nature reserves that are affiliated with the "Friends [of Nature Reserves and Nature Parks] Group".

iv. Exemplary leadership

The protection of Colbyn Valley Wetland provides a friendly opportunity for empowering children to become future leaders by supporting community initiatives. Respondent 22 cited that she:

> *"…Believes it's important to set an example for our child that through involvement in such projects he can make a difference to his community and the habitat in which he lives".*

The respondents believed that government should not be required do everything. According to Respondent 24:

> *"We need to actively protect our environment. State organs* [institutions] *can only do so much, with community participation and involvement the impact of any conservation efforts will be enhanced".*

v. As a good deed and service to the community

Respondent five said that she chose to support the nature reserve *"for all who enjoy nature and the preservation of the area and water sources".* Respondent four participated in the nature reserve to *"…protect an endangered area from developers and to protect nature in general".* Respondent seven added that *"I would like to make a lasting contribution to the protection of the nature reserve and wetlands".* Respondent 13 added that "*I would want to mark off my community service and for fun".*

5.2.4 Reflections on the problems faced by Colbyn Valley Wetland according to primary stakeholders

The formal protection of the wetland does not make it immune from the problems that existed before proclamation. The Colbyn Valley Wetland faces challenges form natural and anthropogenic activities. The stakeholders have taken measures to respond to these challenges within their limited resources.

i. Littering

There are unknown people who dump waste into the wetland in addition to litter that is washed into the area by floods from residential areas (Sherwill, 2015). Sherwill (2015) added that this is worsened by homeless people who have opted to build their shacks inside the nature reserve despite its protected status, immediately after formal protection in 2014. This has triggered some respondents to react very strongly that littering is affecting the integrity of the wetland. They called for the mass involvement of community members in cleaning up the nature reserve. Respondent 18 suggested that *"...we need more manpower to do clean-ups. I suggest school involvement"*. According to Respondent 24 *"the biggest threat is pollution"* of the wetland. Participants understand that it is difficult to hold any one person accountable as there are many sources of pollution.

ii. Continued erosion

Due to the poor management of the upper catchment area of the wetlands and surrounding suburbs, soil is washed away which result in deposition of sediments, as well as inflow of storm drainage water into the wetlands (Sherwill, 2015). These deposits have affected the integrity of the nature reserve to such an extent that the effects are visible to the community members. Respondent 19 said that:

"The wetland itself and particularly the peatland are under threat from erosion due to increased stormwater flows and lack of maintenance of erosion-control structures."

The management of these erosion control measures is normally the responsibility of the local city council.

iii. Compromised security control and access

The nature reserve does not have a dedicated security and access control systems and personnel (personal observation). There is an official gate in the south of the nature reserve which is kept closed, however; there is another illegal entrance with no gate on the eastern

side of the nature reserve. These illegal entrances are what the intruders, waste trucks, poachers and others use to access the nature reserve (Sherwill, 2015). This has affected the safety of the visitors to the nature reserve, who now find it difficult to visit the nature reserve at any time of the day (Sherwill, 2015).

iv. Urban expansion

The nature reserve, as is with many areas covered with Marikana Thornveld in urban areas, is located in a prime position for urban development (GDARD & SANBI, 2013). This makes it a business and city expansion target. One of the main reasons for community mobilisations to push for the declaration of this wetland was to ensure the site is safe from these developments. Respondent 19 said that:

> *"There is a continuous threat of development on the borders of the wetland and in the greater catchment, which could negatively affect water quality and increase stormwater inflows".*

v. Spread of alien invasives

There are a variety of alien species that can be observed on the site, such as Weeping Willow. These species compete with the indigenous species of the wetland. The local community members are aware of the potential risk for spreading invasive flora and fauna species. They understand the impact that this has on the reserve's indigenous species. Respondent 19 claimed that *"alien invasive plants, in particular poplar and pompom weed, are increasing in abundance and displacing natural vegetation".* These invasive plants are visible despite the attempts by the municipality to manage them. The participants believe that if this spread of invasive plant species is not well-managed, it might impact the integrity and functionality of the wetland and other associated ecosystems. This case study, however, takes note of programmes like Working for Wetlands and related, such as the rapid response and pressures programme, which are in place to deal with alien invasives.

vi. Wild fires

The City of Tshwane is generally prone to wild fires (SACN, 2014), and the Colbyn Valley Wetland is no exception. In their natural state, wetlands must be burnt for improved management of the ecosystems (SANBI, 2013). On 29 November 2017 the researcher also observed that the fires killed a few animals (particularly infants in their nests) and plants, as well as damaging the wooden poles used to erect the fence. Another observation made during the site visit was the difficulty in controlling the fires, as there are a number of vagrants in the

nature reserve who burn fires for various reasons. The source of these fires has also led to accusations; Respondent eight claimed that *"...fires caused by train commuters"* are a problem. It is difficult to identify the direct source of fires, which makes it difficult to put up control measures.

vii. Shrinking government budget to support nature reserves

The local government was instrumental in facilitating the process to declare the nature reserve. They became the management authority once the MEC for GDARD declared it a nature reserve. Some respondents feel their support since the declaration is not sufficient. Others felt that corruption hindered government support. Respondent 19 uses their position in the FoCV to *"...request management actions from the reserve manager from the City of Tshwane, and offering to work together with them on certain activities or projects"*. Some respondents said this without wanting to be recorded for fear of reprisal. This was despite the researcher assuring them of their safety. They verbalised this sentiment during the completion of the questionnaire.

viii. Poor infrastructure may be confused with corruption

According to the Department of Co-operative Governance and Traditional Affairs (CoGTA) (2009) there are a number of reported cases of poor quality of infrastructure built by local government institutions. The department further added that this is worsened by the lack of maintenance for the old infrastructure (CoGTA, 2009). The main causes of these problems are usually corruption and incompetency of the service providers to the government (Mashamaite, 2014; Madzivhandila & Asha, 2012). The Colbyn Valley Wetland has poor quality fencing and lack of proper information boards about the site. This is worsened by trespassing, wild fires, motor vehicle accidents and the homeless people. Uninformed members of the public may assume that the government money has been wasted. This is very common when the members of the public rush to point out faults instead of finding the underlying cause of the challenge (Mashamaite, 2014). Members of public may view all the stakeholders involved in the Colbyn Valley Wetland as part of the perceived waste of state money. All the stakeholders must work closely to ensure the site remains in the best possible condition to avoid such perceptions.

5.3 Secondary stakeholder: Provincial Government

The GDARD is one of the secondary stakeholders and was represented by Noza Mathebula on 9 May 2017. Noza Mathebula has made it clear that for the case of Colbyn Valley Wetland to make sense, there must be a proper background given about the department's role in relation to protection of biodiversity and associated ecosystems. The department has a vision of *"expanding the protected areas through a high-level target driven process of securing critical biodiversity and ecological resources in Gauteng province"* (GDARD & SANBI, 2013, p. 5). The GDARD & SANBI (2013) further added that the department has set out a 20-year strategy to protect 166 800 hectares of critical biodiversity, with a short-term target of 30 800 hectares over five years.

The Colbyn Valley Wetland is located within the Marikana Thornveld vegetation type, for which the department has set a target of 10 097 hectares over five-years (GDARD & SANBI, 2013). The GDARD set out the targets in the Gauteng Protected Areas Expansion Strategy in 2013 and the department has since done all within their capacity to ensure that protection of the Colbyn Valley Wetland contributed to meeting the target, as well as ensuring the wetland and the peat are secured (GDARD & SANBI, 2013). The site is a Critical Biodiversity Area which enabled the provincial and municipal government to meet its biodiversity protection targets (GDARD & SANBI, 2013). The GDARD officially became involved in the Colbyn Valley Wetland in 2012.

According to Noza Mathebula, the department's role has been to ensure the Colbyn Valley Wetland is protected by *"assisting with declaring the area as a nature reserve in – in terms of the National Environmental Management: Protected Areas Act, 57 of 2003"*. The Respondent further added that since the declaration of Colbyn Valley Wetland in 2014, the department visits the site at least *once every month* to support the management functions given to the City of Tshwane Municipality.

5.3.1 Reasons for the support of the Colbyn Valley Wetland

The GDARD was involved in the wetlands due the following factors:

i. The special wetland (peat)

GDARD recognises that the Colbyn Valley Wetland contains a special wetland with peat. The peat occupies about 7% of the total size of the wetland (DEA, 2016). The peatland is about 7 000 years of age, with a thickness of about 2.4 m (DEA, 2016).

ii. Level of threat

Noza Mathebula stated that the Colbyn Valley Wetland contributed to the *"provincial critical biodiversity conservation targets".* The Colbyn Valley Wetland Nature Reserve contained wetland ecosystems that were under threat. This included threatened ecosystems, such as the Marikana Thornveld vegetation type. Wetland ecosystems are under general threat in South Africa, and especially in Gauteng (GDARD & SANBI, 2013). The province has only a few wetlands ecosystems left that are functional with intact ecological integrity. This has expedited the efforts to protect the remaining few wetlands. The department ensured that the necessary efforts were put into place to minimise development in all areas that contained threatened ecosystems, including wetlands.

iii. Convenient education, empowerment and research centre

The Colbyn Valley Wetland Nature reserve is surrounded by a number of higher learning institutions within the metro boundaries. The site offers many opportunities for students and researchers to conduct research within their geographical areas. They do not have to travel long distances. The site is also used as a platform for education and empowerment for school children from the surrounding communities. They are able to learn about different animal and plant species.

5.3.2 Services offered by GDARD to the nature reserve

The department's support for the Colbyn Valley Wetland was offered as part of a broader mandate for the conservation and sustainable use of the biodiversity.

i. Facilitation of declaration

According to Noza Mathebula, the GDARD is legally mandated with management of biodiversity and ecosystem which is why the department "*assist*[ed] *with declaration of the area as a nature reserve in 2014"*. According to Noza Mathebula the *"National Environmental Management Protected Areas Act 57 of 2003 (NEMPAA)"* is a necessary legal framework to secure critical biodiversity and ecosystems. Part 3, section 23 of this Act requires that the Minister (or the Member of the Executive Committee/Council on Environment) must declare the site through a gazetted notice. The gazette notice includes technical biodiversity information about the site.

ii. Assist with the development of the Environmental Management Programme (EMP)

Part of formally declaring the Colbyn Valley Wetland as a nature reserve was the requirement to develop an Environmental Management Programme that will guide the management of the site. Noza Mathebula stated that the department is also empowered *to "assist with the development of the Environmental Management Programme (EMP)"* to established protected areas. Section 33 of the Protected Areas Act requires the MEC to conduct public consultation by informing members of the public of her intent through a government gazette. This is to ensure that the nature reserve had dedicated support such that the protected ecosystems remained safe and intact.

iii. Auditing of the Environmental Management Programme

Auditing the EMP includes quality and compliance checks on the facilities and resources found in the nature reserve. According to Noza Mathebula, GDARD conducts annual *"audits of the EMP"* in terms of implementation of the recommended activities in the EMP. This includes review of the challenges faced during the implementation as well as steps taken to address these challenges. The audit provides an opportunity to review any unworkable aspects of the programme.

5.4 Tertiary stakeholders: Agriculture Research Council

The Agricultural Research Council (ARC) is one of the tertiary stakeholders. The ARC was represented by Adri Laas on 10 April 2017. The ARC supports activities related to education, cleaning and training initiatives in the wetlands, particularly on commemorative calendar days (ARC, 2014). In 2013, a year before the official declaration of the Colbyn Valley Wetland as a nature reserve, the ARC led other stakeholders in a successful cleaning campaign in honour of the 67 minutes of Mandela Day. In describing this, the DAFF news (2013, p. 6) reported that the ARC thought *"Everyone did their bit to ensure the success of the day—the ARC as lead organiser and co-ordinator; the Division: Nature Conservation of the City of Tshwane, who approved the request and assisted with the delineation of the clean-up area; Ms Siobhan Muller, Councillor of Ward 82, who organised gloves and refuse bags, the removal of the refuse afterwards, as well as the officers from the Metro Police; the WRC, who sponsored drinks and corporate items; and Transparent Financial Services, who took care of first aid needs"*.

The DAFF news (2013, p. 6) further reported that the ARC is also acting on their mandate in supporting Colbyn Valley Wetland. *"Although it was hard work, the results made everyone*

feel satisfied and the overall response was that they had made a worthwhile contribution to the environment. Possibly the most important aspect of the event was to focus attention on the Colbyn wetland and its important role within the city. The sustainable management and utilisation of water in wetland ecosystems is one of the key focus areas of the ARC's water research and development agenda" (The DAFF news, 2013, p. 6).

Tertiary stakeholders generally do not wield any administrative authority over the Colbyn Valley Wetland but have influence through provision of necessary technical skills and training resources. The ARC involvement in the Colbyn Valley Wetland dates far back to 2009, during the World Wetland Day, when the researchers accompanied learners to the site to teach them about wetlands (ARC, 2009). In responding to the question about the interest of ARC in Colbyn Valley Wetland, Adri Laas said the ARC is interested in *"all aspects of the wetland* [particularly] *– soil, vegetation, bird life, rehabilitation and conservation"*. The role of tertiary stakeholders in the Colbyn Valley Wetland includes the provision of the following, amongst others:

i. Focused training workshops for officials working with wetlands

The ARC partners with other organisations involved in the Colbyn Valley Wetland to facilitate interdisciplinary workshops that aim to inform practitioners and managers about the wetland (ARC, 2014). The ARC (2014) added that the workshop sessions address various key wetland issues related to management, rehabilitation and maintenance of wetlands, through field sessions on invasive species control and observation for immediate responses. The workshops are open to a range of interested people, particularly state officials, consultants and students. They are often run on commemorative calendar dates such as World Wetland Day (ARC, 2014). The workshops also aim to address the misaligned legislation on management of wetlands within different sectors in South Africa, using Colbyn Valley Wetland as an example (ARC, 2014). These workshops encourage good working relationships amongst all stakeholders with the responsibility of managing wetlands (ARC, 2014)**.**

ii. Facilitation of wetland foundational education for children

The ARC has been running various educational programmes for school children dating back to 2009 and continues to do so even after declaration of the site as a nature reserve (ARC, 2009; ARC, 2014). The researchers develop focused learning materials for children with easy comprehension and understanding which includes infographics and interactive classroom

materials that teach about wetlands (ARC, 2009). The ARC (2009) added that they do this through a classroom presentation with children and their teachers, as well as through field observation. The institution manages this programme through its own financial resources supported by other volunteer institutions (ARC, 2014). The FoCV mobilise children from surrounding schools to come out to learn about the wetlands. This is done with the view that when growing up with relevant education about their wetlands, children are more likely to draw inspiration and make **efforts to continue protecting wetland resources (ARC, 2009).**

iii. Development of scientific content relevant to Colbyn Valley Wetland

The ARC is interested in the characteristics and patterns of the wetland (ARC, 2014). The accumulation of water by wetlands has an influence in the structural composition of the soils, including patterns of growth by plant species (GDARD & SANBI, 2013). The ARC together with other partners develops research materials that help to understand the wetland, based on best available science (ARC, 2014). This is also linked with practical field observation that facilitators can show to participants in attendance during the workshops. The scientific knowledge was used to mobilise continued support for the wetland from ordinary residents around Colbyn Valley Wetland (ARC, 2014).

5.4.1 Reasons for the ARC's participation in the Colbyn Valley Wetland

i. Colbyn Valley Wetland fits within the mandate of ARC

The Colbyn Valley Wetland fits into the mandate of the ARC's Institute for Soil, Climate and Water (ARC-ISCW) which works closely with other internal institutions to address wetland conservation and sustainable usage (ARC, 2009). Through this mandate the ARC develops wetland programmes that guide the procedures for scientific wetland delineation (ARC, 2009). The ARC further works to develop indicators for monitoring the health of Colbyn Valley Wetland in relation to the overall catchment (2009).

ii. Lack of science-based knowledge about wetlands

The ARC provides necessary scientific information on the wetland, which is then disseminated to the visitors of the wetland (ARC, 2009). This presented an opportunity for the ARC and various organisations to come together to develop the educational content for the Colbyn Valley Wetland. The ARC is also a regular participant in an annual programme to engage the broader community about the wetlands in general, using the Colbyn Valley Wetland as a specific case (ARC, 2014).

iii. Continued threat to Colbyn Valley Wetland

The efforts made by the City of Tshwane to enable other stakeholders to participate in the protection of Colbyn Valley Wetland has kept the ARC committed to the control of alien species and sediment deposition (ARC, 2014). The ARC understands the limited capacity that exists across institutions of government (ARC, 2014). The ARC also fully supports the views held by local residents that the Colbyn Valley Wetland be protected.

5.5 Conclusion

This chapter presented the reasons behind the stakeholders' participation in the nature reserve. It also provided the basis upon which certain decisions were taken by stakeholders in ensuring the Colbyn Valley Wetland was protected. All the respondents volunteered their views because they were aware of the overall purpose of this case study. The primary stakeholders have highlighted that their participation is largely driven by their love and appreciation of the wetland ecosystem, as well as the threats to the ecosystem, such as urban development, pollution and loss of biodiversity. Statutory obligation is the primary driver for the secondary stakeholders to conserve and promote sustainable utilisation of biodiversity and associated ecosystems. The tertiary stakeholders are providing valuable volunteer support to ensure the best learning and management programmes are rolled out in a manner that promotes sustainable utilisation of the wetland.

CHAPTER 6: DISCUSSION

6.1 Introduction

The purpose of this chapter is to bring the findings of the study into context in relation to the existing knowledge about wetland management with stakeholders. This includes new insights that the study may have provided with the help of the research questions.

6.2 Factors hindering the progress of the wetland

The results have shown that although the wetland is now officially protected, there remain a range of difficulties that stakeholders experience. These challenges are discussed as follows:

6.2.1 Political uncertainties

The management of a wetland is a complex process influenced by both natural and anthropogenic factors (Chatterjee *et al.*, 2008). The Colbyn Valley Wetland faces complexities from influential external factors, particularly the uncertainties of political leadership. The 2016 local government election resulted in the City of Tshwane electing a new coalition government which does not allow for an outright decision-making but requires political consensus amongst the parties. This coalition government is prioritising job creation (Mashinini, 2016; Msimanga, 2017). The Colbyn Valley Wetland was proclaimed as a nature reserve despite the possible developmental opportunities that may bring about jobs (DEA, 2016). Thus, the political changes in Tshwane have brought uncertainties, which have since created expectations and mistrust amongst the stakeholders. According to Respondent 19 the *"management* [City of Tshwane] *needs to become more purposeful and proactive"* in fulfilling their obligation to the Colbyn Valley Wetland. This was supported by Respondent 22 who believes there is a "*lack of support by the local government"* despite accepting the responsibility to manage the Colbyn Valley Wetland.

The political dynamics of the city council are also linked to the lack of interest from the members of the public. According to Respondent 1 the *"politics* [and] *lack of interest from* [the] *general population"* is threatening the sustainability of the Colbyn Valley Wetland. The city council has not explicitly stated whether it will respect the declaration status of the Colbyn Valley Wetland, or if it will convert it to other land uses that may create jobs. It must be noted that ignoring a gazetted nature reserve would have legal consequences. Once a nature reserve has been declared, there are legal processes required to retract that declaration.

6.2.2 Minimal programmes to mobilise broader community

The Ramsar Convention requires parties (countries), including South Africa, to develop a programme of action on communication, learning, empowerment and awareness for local communities surrounding wetlands. The Convention further adds that such programmes must recognise the indigenous knowledge that exists in communities (Ramsar Convention Secretariat, 2010b). The stakeholders at Colbyn Valley Wetland do not have a dedicated public outreach programme, but do run programmes open to the public on selected calendar dates. It is the lack of formal programmes to widely consult local residents that has led to the FoCV being the sole entity representing local residents. The recognition of FoCV as a single representative of local residents may be misleading, since there are no efforts to reach out to new local residents. However, the local residents feel the starting point for reaching wider community is to increase the participation of children first. According to Respondent 22 *"it is important to set an example for our child*[ren] *that through involvement in such projects* [they] *can make difference".*

6.2.3 Lack of diversity in the FoCV

There are always affected parties to be consulted when attempts are made to protect biodiversity and associated ecosystems (Willoughby, Grimble, Ellenbroek, Danso & Amatekpor, 2001). The consultation must recognise all the views from the parties to prevent dominance of one social class (Ramsar Convention Secretariat, 2010b). According to Grimble (1998), there are affected parties that stay away from the proposed development because they are not empowered to raise their views. These types of stakeholders may only react when they begin to feel or observe negative consequences of the development. The questionnaire has found about 88% of primary stakeholders belong to the white community. Unfortunately, this was not a true reflection of the racial make-up of local residents who live around the Colbyn Valley Wetland, which has over 60% black Africans (City of Tshwane, 2013a). The lack of participation by other races at Colbyn Valley Wetland may be due to the lack of broader consultation. This, however, should not undermine the fact that all the participants involved are doing so voluntarily and other parties may not be willing to volunteer their time.

6.2.4 Consensus takes precedence in decision making

The consultation of stakeholders is a lengthy process, which often varies between cases and depends on the social circumstances of the affected communities. Broad consultation leads to good relationships that are required in reaching a meaningful decision by all parties (Ramsar Convention Secretariat, 2010b). The questionnaire revealed that stakeholders at Colbyn Valley Wetland use meetings, workshops, personal and institutional contact to engage each other before a decision is taken. For each major task that has to be executed, a volunteer leader regularly provides feedback to others on the progress. In addition to this, an attendance register is signed by all participating stakeholders and minutes are circulated after each meeting.

6.2.5 The site 'blocks' development?

Cities across the world are empowered to sell portions of the land for development and in that way, generate revenue (Chenchen, Han, de Vries, Wanga & Guochao, 2013). The level of demand for a piece of land in cities across the world attracts potential investment opportunities (De Leon & Kim, 2017). The City of Tshwane council previously intended to convert the site into a park-and-ride facility, as part of smart city programmes, which provoked local residents to gather petitions and objections against such a decision. This raises the perception that keeping the site protected is a way of blocking development. Another perspective that could be taken by unemployed members of society is that the protection of the wetland is blocking job opportunities. This might also favour the stance taken by the current city council which is prioritising job creation as a vehicle to improve lives of ordinary people.

6.3 Areas of improvement for the Colbyn Valley Wetland

The stakeholders have done well to call for the protection of the Colbyn Valley Wetland. It is the co-operation of all stakeholders that made this process easier, despite all the competing interests in the site. It is important to note that even after the successful proclamation of the wetland, there is still much work to be done to ensure the nature reserve serves its purpose.

This section gives detail into areas that require improvement:

6.3.1 Mobilisation of funds for infrastructure for the wetland

The Ramsar Convention Secretariat (2010) states that the protection of wetland ecosystems in highly pressured landscapes requires the support of built infrastructure. The Ramsar Convention Secretariat (2010) further adds that it is necessary to regulate access to the site and to ensure the resources protected are utilised sustainably. However, the building of infrastructure requires sustainable financial resources for installation and regular maintenance. The Colbyn Valley Wetland lacks proper built infrastructure such as ablution blocks, strong fences, access routes, dedicated bird watching spots, and the like. This has negatively affected the visitor experience as some do not regard it as attractive enough to visit. According to Respondent 23 *"the City of Tshwane needs to assign a budget to the maintenance and protection of the* [nature] *reserve.* [The municipality] *needs to spend money on proper fences, fire breaks, staff to man*[age] *access control at gates and to patrol* [the nature] *reserve…"* The lack of dedicated funds for the nature reserve may hinder the progress with sustainable development and access to the nature reserve by the public.

The need for sustainable funds for supporting infrastructure is also part of the first operational goal of the Biodiversity Management Plan for the Colbyn Valley Wetland ecosystem that the stakeholders have developed (DEA, 2016). This goal requires that there must be a strong campaign to mobilise funds to manage the wetland.

6.3.2 Securing support of political leadership from the council

The protection of biodiversity must be aligned with developmental objectives of the affected land owners. The development of local communities is a responsibility of the local government which is led by political leaders (Cadman *et al*, 2010). The success of the Colbyn Valley Wetland is dependent on the political leadership of the City of Tshwane. According to Respondent 23 *"there needs to be direct involvement from the council…"* to ensure the uncertainties are cleared and stakeholders stay motivated. This requires all the stakeholders work closely with the local political representatives who will be their voice in the council.

6.3.3 Outreach initiatives

The reflection on the impact of the wetlands on society must be based on the feedback from local communities, amongst others (Ramsar Convention Secretariat, 2010b). The Colbyn Valley Wetland has suffered a lack of representation from affected local residents who were

not consulted previously. This lack of representation is a sign that a lot more must be done to reach out to all the relevant stakeholders.

6.4 Reasons for different route to the protection of Colbyn Valley Wetland

The management of biodiversity and associated ecosystem are a shared responsibility across government institutions (Shackleton, 2009). The Colbyn Valley Wetland presents an example wherein local residents have taken on some responsibilities to support the government to protect the wetland. The participation of local residents was influenced by the continuous threats to the wetland and the slow response of the competent authority responsible for the protection of this ecosystem (Sherwill, 2015). The protection of biodiversity and associated ecosystems is a limited by a variety of legal and procedural issues, which makes it difficult to protect the Colbyn Valley Wetland without the participation of all stakeholders.

The following were instruments that the Gauteng Province can use to protect ecosystems were not helpful in this case:

6.4.1 Biodiversity stewardship programme was not suitable

The GDARD note that it has become extremely expensive to secure valuable biodiversity and associated ecosystems. This is worsened by the decline in the state budget for the conservation of biodiversity (GDARD & SANBI, 2013). Biodiversity stewardship requires the competent authority to enter into agreement with the landowners to secure critical biodiversity (Driver *et al.*, 2012). However, biodiversity stewardship was not possible since the land was already in the ownership of the municipality with a predetermined land use. For the land use to change, the municipality had to follow a number of administrative and political procedures that include consideration of Section 14 of the Municipal Finance Act [Act 56 of 2003]. This section outlines conditions upon which the municipality can transfer assets in order to enhance service delivery to the people (Umhlaba Consulting Group, 2013).

6.4.2 Biodiversity offsets not viable

Biodiversity conservation must never be perceived as a stumbling block to socio-economic development. It must be noted that the socio-economic development and environmental management complement each other. The Colbyn Valley Wetland is part of the Marikana Thornveld which occurs in areas that have great economic development potential (GDARD & SANBI, 2013). As a result, not all the likely impacts can be avoided, minimised or rehabilitated at the site of the impact (SANBI, 2013). In circumstances where the cost of

losing ecosystems or the critical biodiversity are more severe, it becomes possible to consider biodiversity offsets (Department of Environmental Affairs and Development Planning, 2007). The Colbyn Valley Wetland is within the critical biodiversity areas, and also serves as ecological infrastructure necessary for the survival of the Hartbeesspruit. Any intent to develop the site for commercial reasons is going to undermine the integrity of the ecosystems, which would also affect the Roodeplaat Dam and water provision to the City of Tshwane. The only option possible is the compensation of the residual impact as guided by the mitigation hierarchy shown in Table 6.1.

Table 6.1: Impact mitigation hierarchy (Source: GDARD & SANBI, 2013).

Mitigation hierarchy	**Interpretation**
Avoid or prevent	Any plan, activity or action that is likely to cause fragmentation to biodiversity and its associated ecosystems to be avoided at all cost.
Minimise	If the plan, activity or actions cannot be prevented, they must ensure that there is a minimal effect of the integrity of biodiversity and associated ecosystems.
Rehabilitate	Where the impacts to biodiversity and associated ecosystems are unavoidable, it is necessary to rehabilitate the affected area to at least a near-natural state or a better land use.
Offset	Offset is the last option on the mitigation hierarchy. Offsets involve compensation through measurable outcomes for the damage caused to the ecosystem or biodiversity by development or any actions. This takes place when every effort has been taken to avoid, minimise and rehabilitate but still the biodiversity is irreversibly affected.

6.4.3 Vested interest in the wetland

Section 33 of the Protected Areas Act requires that members of the public are informed about any changes in the use of the land that surrounds them. This section further affords the members of public the avenues to raise objections to any forms of development if they deem necessary. However, the government remains the custodian of biodiversity from any form of land or sea within the boundaries of South Africa (GDARD & SANBI, 2013). It is for this

reason that the government, local residents and other interested parties had to work together to find common ground that would ensure the wetland is safe from any forms of exploitation.

6.5 Enabling factors for stakeholders working together at Colbyn Valley Wetland

It is evident that the Colbyn Valley Wetland was protected due to co-operation from all the stakeholders. These stakeholders had to make a number of decisions that would ensure the Colbyn Valley Wetland is protected. There are no monetary benefits that institutions gain by participating in the management of Colbyn Valley Wetland.

6.5.1 Volunteers are committed

The development of a working Biodiversity Management Plan for Ecosystems allows institutions or individuals to formally commit on specific activities that are beneficial to the site. In the past, all parties were volunteering except for the government/authorities who had the responsibility of protecting ecosystems.

6.5.2 Prioritising activities with limited finances

There should be a comprehensive understanding of the cost associated with establishing and running a protected area. This includes the trade-offs between the benefits to biodiversity or ecosystems weighed against the financial cost required (Swemmer, Mmethi & Twine, 2017). All the stakeholders in Colbyn Valley Wetland understand that there will always be limited financial resources. This has helped volunteers to focus on those activities that do not require financial support, but which still benefit the wetland.

6.5.3 Consensus keeps the relationship intact

The conservation of biodiversity through establishment of protected areas can never be isolated from the perceptions of the affected landowners (Ciocănea, Sorescu, Ianoși, Bagrinovschi, 2016). The concerns and views of affected stakeholders must be addressed and be integrated in the management plans of the established protected areas (Ciocănea *et al.*, 2016). History has taught many that a lack of consensus with landowners or interested stakeholders often results in unwanted conflicts that cause failure in the establishment of protected areas (Cadman *et al*, 2010). The stakeholders in this case study understand that their primary objective is to protect the Colbyn Valley Wetland. This consensus helped the decision-making process, as all stakeholders put maximum efforts to ensure the Colbyn Valley Wetland would benefit.

6.5.4 Independent administration

The stakeholders, regardless of the role they play, have unequal influence on matters of governance relating to ecosystem management (Mutekwa & Gambiza, 2017). Mutekwa and Gambiza (2017) add that this is widely recognised when the flow of ecosystem benefits is a subject of political and economic interest. The stakeholders involved in the Colbyn Valley Wetland have respect for each other's roles and assigned responsibilities. There is no stakeholder that is allowed to reign over others. All the stakeholders understand the bigger picture of protecting the Colbyn Valley Wetland. As a result,, each stakeholder remains independent in conducting its business. This has ensured that no stakeholder feels it has more responsibility than another.

6.5.5 Institutional proximity to wetland site

The Colbyn Valley Wetland is located within the City of Tshwane, which is the capital city of South Africa. This city hosts the headquarters of many institutions that are stakeholders to the Colbyn Valley Wetland such as the ARC, Water Research Commission, and Department of Environmental Affairs etc. This makes the logistics of arranging meetings and field visits easier, without having to travel long distances. This is a good project for financially constrained institutions.

6.6 Sources of resilience against competing land-uses

Wetland ecosystems are on their own resilient to alteration (Driver *et al.*, 2012). However, for Colbyn Valley Wetland to survive, a number of factors were involved, including:

6.6.1 Media support

One of the ways in which the Ramsar Convention Secretariat is working to stop and reverse the continued loss of wetland ecosystems across the world is through mass communication. The Secretariat uses print media, journals, events, social networks, corporate identity and branding to communicate the message, amongst others. The messages are packaged to suit a particular audience, which ranges from developers, farmers, policy and decision makers, and school children, to the general public (Ramsar Convention Secretariat, 2016). This approach is also adopted by parties to the Convention who regularly provide country reports on what each country, including South Africa, is doing to impart the messages on wetland protection and management.

The Colbyn Valley Wetland received much media coverage towards the issuing of intent to declare by the provincial MEC for of GDARD which includes notable media coverage from the *Pretoria News*, which covers big stories about the City of Tshwane and other related international and local news. The other print media that covered the Colbyn Valley Wetland are the *Rekord: Pretoria East* and *Moot* which largely cover local stories. The community rejection of the development also touched the property development community which was covered by the sister newspaper of *Pretoria News* called *Pretoria News Property*. The sections below detail how the Colbyn Valley Wetland was covered by the media in general terms.

i. Pretoria News

The *Pretoria News* published notable stories in 2012 and 2013 with the title *"Colbyn residents cry foul over threat to wetland"* and *"Colbyn park-and-ride on the agenda"* (Hlahla, 2012; Pretoria News, 2013). The two stories were about the Colbyn local residents rejecting the proposal to develop the Colbyn Valley Wetland into park-and-ride facilities (Pretoria News, 2013). The story pointed to problems that may occur if the wetland is removed, including an opinion that described the likely environmental consequences of removing the wetland as a *"disaster"* (Pretoria News, 2013). The news story sought opinions from the FoCV, International Mire Conservation Group, and Colbyn Residents and Ratepayers Association, all of which were in support of the protection of wetland and rejection of the building of park-and-ride facilities.

The park-and-ride facilities were part of a bigger plan by the City of Tshwane to turn the Hatfield business node into a car-free zone as outlined in the Hatfield Node Urban Development Framework for the city. The car-free zone refers to the part of the city where motorised vehicles are prohibited with the exception for vehicles providing critical services to the people, such as emergency services (Wright, 2005). These zones integrate economic expansion, environmental-friendly development that also improves the lives of people without necessarily depending on the motorised mobility of goods and services (Wright, 2005). The absence of cars in the city minimises discharge of harmful gases (such as CO_2) that cause global warming, reduces traffic congestion and ensures clean air in the city.

ii. Independent Online media

This media outlet ran a story of residents rejecting the intended land development proposed in the site inclusive of Colbyn Valley Wetlands under the title *"Environmental protest grows*

over proposed Colbyn de[ve]*lopment"*. The story noted strong petitions from over 2000 local residents who did not want Colbyn Valley Wetland to be part of this development (Pretoria News Property, 2012). The story quoted the local ward councillor who was put under pressure to act in favour of the local residents' call to never build the park-and-ride facilities on the wetland (Pretoria News Property, 2012). The story also reported that the City of Tshwane spokesperson was contacted to hear the position of the municipality in relation to the proposed development on the wetland (Pretoria News Property, 2012). The spokesperson however had nothing to say at the time of going to print.

iii. Pretoria Rekord/Moot

The call for Colbyn Valley Wetland to be protected was also twice covered by the local newspaper called *Rekord: Pretoria East* and its sister publication *Rekord: Pretoria Moot* reporting on the intent to declare. The first storyline ran in 2014 under the title *"Proposed Colbyn wetland sale vehemently opposed"* and the second in 2015 with the title *"Colbyn wetlands safe after community action"* (Du Martins, 2014; 2015). This first story focused on further developmental pressure that was beginning again, with the intent to sell part of the wetland by the city council (Figures 6.1, 6.2 & 6.3). This faced the same rejection by local residents, in the same manner, as the earlier intent to develop the park-and-ride facilities. This time the objection was said to have come from the local residents, wetland experts, business and the national Department of Water Affairs (Du Martins, 2014).

The second story was a follow up to report back on the clarity provided by the City Council that the portion that they wanted to sell was not necessarily the Colbyn Valley Wetland but a portion that was outside the wetland (Du Martins, 2016). The local residents, however, argued that the portion served as a buffer that supports the wetland (Du Martins, 2014).

All these newspapers are distributed across the City of Tshwane, giving ease of access to information for the population of Tshwane, particularly those that were interested in the wetland.

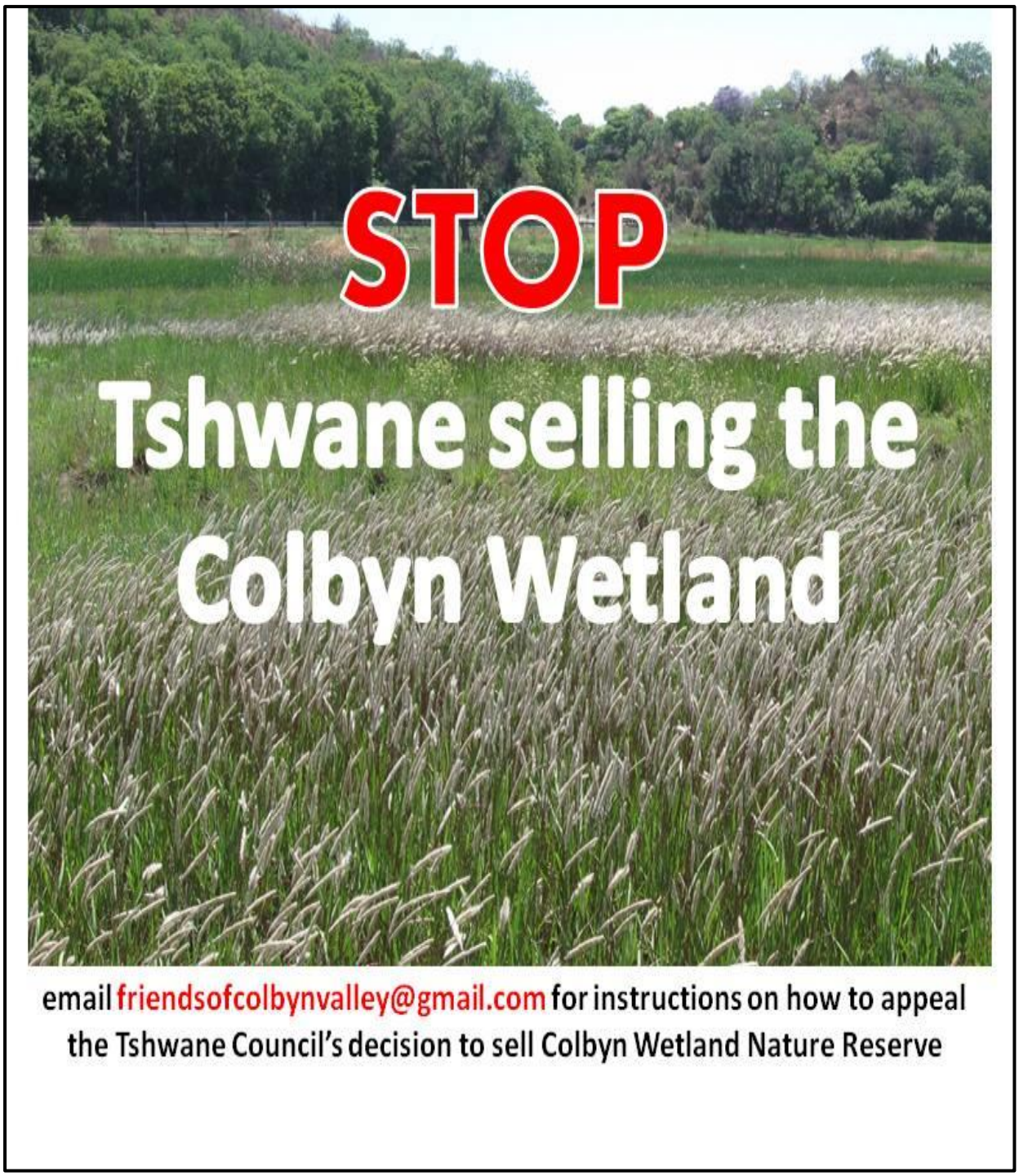


Figure 6.1: The poster calling on all the residents to oppose the selling of the Colbyn Valley Wetland (Source: Facebook: FoCV, 2014)

This poster was followed by the full instruction on how to appeal the decision of the Council of the City of Tshwane to sell Colbyn Valley Wetland. The instruction was as follows:

Please appeal against Tshwane's decision to auction off the Colbyn Wetland!

On 4 November 2014, the Council of the City of Tshwane Metropolitan Municipality approved a decision to sell a number of municipal properties. Among these (Region 3, para. 1) was 'Portion of Remainder of portion 6 and Remainder of the farm Koedoespoort 456-JR 609 589 m^2 in extent', which includes the entire Colbyn Wetland Nature Reserve (although the wetland and reserve are not specifically mentioned in the description, the stated area implies that the entire reserve is included in the sale). It is proposed in the decision that this property be developed for mixed usage including offices, hotel or retail.

Under section 62[1] of the Municipal Systems Act (No. 32 of 2000) concerned citizens ('affected persons') have 21 days (until 24 November) to appeal this decision. It is important that as many individuals and organisations as possible submit appeals if we want to stop the sale and ensure the future protection of the Colbyn Wetland. Anyone can appeal – you do not need to live in Pretoria or ever have visited the area in question.

How to submit an appeal:

1. **Write a letter to the City of Tshwane Municipal Manager** stating that, under s62 of the Municipal Systems Act, you are submitting an appeal against the following decision: **'Decision to sell** 'Portion of Remainder of portion 6 and Remainder of the farm Koedoespoort 456-JR 609 589 m^2 in extent', made at the City of Tshwane Special Council Meeting 4th November 2014, Report of the Speaker, Corporate & Shared Services Department: Proposed sale of several Municipal Properties Item 1'.
2. **Introduce yourself or your organisation** and its connection to or stake in the Colbyn Wetland Nature Reserve (identify yourself as an 'affected person' in terms of the Act – simply being a concerned member of the public who wants the Colbyn Wetland to continue to exist is enough)
3. **State your reasons** for objecting to the decision, beginning with the site being the location of the Colbyn Wetland Nature Reserve: For example, the following could be included (use your own words and emphasize the values of most importance or relevance to yourself or your organisation):
    a. **VALUE:** The value of the wetland and surrounding nature reserve, to the people of Pretoria, Gauteng and South Africa:
        i. for biodiversity conservation – providing a refuge and green corridor in an urban landscape, and an important node linking the east–west green corridor of the Meintjieskop, Colbyn and Silverton ridges, and the north–south corridor of the Hartbeesspruit, University of Pretoria Experimental Farm, Strubenkop and the CSIR nature reserve.
        ii. as natural infrastructure – providing free water treatment and flood control

[1] 62. Appeals.—(1) A person whose rights are affected by a decision taken by a political structure, political office bearer, councillor or staff member of a municipality in terms of a power or duty delegated or sub-delegated by a delegating authority to the political structure, political office bearer, councillor or staff member, may appeal against that decision by giving written notice of the appeal and reasons to the municipal manager within 21 days of the date of the notification of the decision.

Figure 6.2: First page of the call for local residents to reject the selling of portion of Colbyn valley wetland (Source: Facebook: FoCV, 2014).

iii. scientific and research value – containing a 7000-year old peatland, among other research-worthy aspects
iv. educational value – an incredible site within the city for environmental and wetland education, not just for scholars and the public, but extending to university and specialist training
v. recreational value – a site less than 10 km from the city centre offering nature-based recreation, e.g. birding, wildflower walks, etc.

b. **LAND USE:** The only appropriate, desirable and legally-authorised land-use option for the largest portion of the site is conservation, as recognised by the proclamation of the area as the Colbyn Wetland Nature Reserve on 25 June 2014 (Notice 1972 of 2014, Gauteng Provincial Gazette). Under the Protected Areas Act, the primary land use of the site must be for conservation – the type of development envisaged will therefore require deproclamation of the reserve or withdrawal of the required land, which can only take place by a resolution of the Gauteng Provincial Legislature. Under the National Water Act, any development that could legally take place on the site will require a Water Use Licence.

c. **LAND OWNERSHIP:** If the wetland ecosystem and the benefits it provides are to be maintained, the area must continue to fall under the protection of the state as a nature reserve. The Colbyn Wetland is a public asset and shared heritage – it belongs to the people of Pretoria, Gauteng and SA, and cannot be allowed to fall into private hands, or to be destroyed by private (or state) development.

d. **DECISION MAKING PROCESS:** A decision of this nature and impact should not have taken place without a public participation process.

4. **BEFORE 24 NOVEMBER 2014:** Send the letter to the City Manager, Mr Jason Ngobeni, at jasonn@tshwane.gov.za, and request confirmation of receipt of your letter from the recipient. Remember to also tick the options to request a '**delivery receipt**' and '**read receipt**' for your mail. Please also '**Bcc' your mail to** friendsofcolbynvalley@gmail.com.

The following ADDITIONAL DOCUMENTATION is included for your reference:

- Notice and Agenda of Special Council Meeting 4th November 2014 (abridged)
- Example of a letter of appeal submitted for another Council decision
- Background information on the Colbyn Valley Wetland Reserve, prepared by Friends of Colbyn Valley

Figure 6. 3: Second page of the call for local residents to reject the selling of portion of Colbyn Valley Wetland (Source: Facebook: FoCV, 2014).

6.6.2 Interest for community service

Community services offered to South Africans vary with sectors, intention and purpose (Stats SA, 2016). These services can be offered as part of academic study (particularly by health science students), personal contribution for good cause, reintegration into community for corrective measures, or a contribution to those who would otherwise not be able to help themselves. In South Africa, there are citizens who are obligated to offer community services for legal reasons and those that give services as a good deed to the country (Stats SA, 2016).

According to Respondent 18, she offers support to the Colbyn Valley Wetland through participating in the *"clean-up*, [because she] *loves community…".* This is a personal voluntary service that is offered with no compensation but the good cause of seeing the Colbyn Valley Wetland well cared for.

6.6.3 Desire for healthy environment

The ecosystem goods and services from Colbyn Valley Wetland benefit local residents in many ways. Wetland ecosystems are protected across the world for the many benefits they offer to people (McNally, Gold, Pollnac & Kiwango, 2016). According to Section 24 of the Constitution of the Republic of South Africa everyone has a right to the environment that is not harmful to their well-being. Colbyn Valley Wetland remains one of the few environmental features that support the well-being of the local residents. This was supported by Respondent 19 who said *"As I live on the border of the reserve it plays an important role in my quality of life…".*

6.6.4 Reasonable cost of activities

The Ramsar Secretariat has cited that one of the difficulties in running the business of the Convention is mobilisation of financial aid to support logistics of regional representatives to attend meetings. It is the same explanation that other less active parties to the Convention raise when questioned about their participation (Ramsar Convention Secretariat, 2013). This challenge can also be viewed at a smaller scale, when understanding the management of individual wetland ecosystems. The stakeholders at Colbyn Valley Wetland host business meetings, workshops and related gatherings near the wetland which cost less to all the stakeholders. The stakeholders do not have to travel long distances to attend activities of the wetland. The residents also have the local community hall which they use for FoCV gatherings and events.

6.6.5 Minimal legal challenges from interested developers

The City of Tshwane has committed in its Vision 2055 to expand infrastructure and development in a manner that supports environmental sustainability. This commitment makes it difficult for the City to approve every development that is proposed particularly on environmental sensitive landscapes, which would potentially attract further legal challenges (City of Tshwane, 2013b). There are currently no known legal proceedings against the protection of Colbyn Valley Wetland from interested developers.

6.7 Conclusion

The proclamation of the Colbyn Valley Wetland could not be possible without committed stakeholders. The unwavering support of stakeholders in all stages before and after declaration shows that their support was genuine. This chapter has discussed details of some of the key enabling factors that keep the stakeholders firmly committed. The formal protection of the Colbyn Valley Wetland was one of many steps to ensure the human-induced abuses on the wetland are stopped. It will take continuous effort to ensure that the wetland retains its natural state of ecosystem functionality.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

7.1. Introduction

This case study sought to establish the motives behind the involvement of multiple stakeholders in the protection of the Colbyn Valley Wetland, including their sustained commitment post-declaration to ensure the wetland is sustainably utilised. This quest for motives of stakeholder participation resulted in seven chapters that ensured the study followed a credible procedure to finding answers.

The first chapter introduced the case study, the underlying reasons for the research and the research questions that the study needed to answer.

The case study was conducted at the Colbyn Valley Wetland, and the study site was described in detail in Chapter Two. The history of the site from its early owners to the current municipal management was described. This included an investigation of the biophysical features of the wetland. The case study also considered the demographics and the socio-economic context of the people surrounding the wetland.

The third chapter was a review of literature related to this case study, particularly the management of wetlands in prime land for urban development. It included an assessment of the relationships between wetlands and people. It also investigated the factors that influence the behaviour of communities and their decision-making processes, including the compromises they are willing to make to ensure that wetlands and associated ecosystems are protected.

The methodology adopted for this case study was closed-ended and semi-structured questionnaires. Chapter Four provides the details about the methods used. The chapter provided consideration of ethical issues, including respecting the rights of participants, and the consistency in the collection of data.

Chapter Five presented the results of the survey, including quantitative and qualitative results. The stories from stakeholders about how they came to be an involved in the Colbyn Valley Wetland were shared through quotes.

In Chapter Six, the discussion ensured that the results were put into context in relation to the known literature about wetland protection and the participation of multiple stakeholders.

Chapter Seven concludes the case study. This chapter will explain how the case study met its objectives and will make further recommendations were necessary.

7.2 Rationale

As was presented in Chapter Two, after more than two decades of local residents calling for the protection of Colbyn Valley Wetland, the GDARD finally declared the site a nature reserve on the 25 June 2014. The local residents, along with various other stakeholders, had successfully helped bring this about (Sherwill, 2015). The biodiversity and associated ecosystems found on the site are now safer due to this proclamation. Given the possible alternatives that the land could have been used for, this study sought to examine why the various stakeholders chose to work together to protect the wetland, especially as there was a lot of pressure to use the land for other purposes. This wetland site could potentially have been used for valuable economic opportunities that could create jobs, improve human settlements and/or bring municipal services/shops closer to the people. The local residents, together with other stakeholders, chose the protection of the site above every other possible opportunity.

According to Chatterjee *et al.* (2008) wetlands that are managed with the involvement of all the necessary stakeholders have a better chance of surviving. These stakeholders provide the necessary support and knowledge which enables them to identify the possible problems that the wetland may face. However, it is not always the case that affected parties are willing to protect wetland biodiversity and associated ecosystems (Borrini-Feyerabend *et al.*, 2004).

The following were some of the factors that provided the rationale for this case study:

7.2.1 Partnership that became successful without a binding contract of agreement between the stakeholders

The stakeholders involved in the Colbyn Valley Wetlands worked together despite not having a binding contract. The lack of contractual agreement means that the reasons how and why stakeholders came together before the site was declared a nature reserve were undocumented. The government in South Africa enters into various forms of contract with all forms of stakeholders to ensure they work together for the common goal of conservation of biodiversity and associated ecosystems (Government South Africa, 2010).

7.2.2 Lack of species and spatial data about the wetland

Additionally, the declaration of Colbyn Valley Wetland as a nature reserve was done using very old species data. For example, the declaration included noting the *"rare Lycaenid butterfly"*, despite this species being last sighted in the early 1990's at the site (Sherwill, 2015). Given the presents of diversity of species of fauna and flora, wetlands ecosystem and biodiversity in general, it was not clear if the protection of the site was intended for everything inside.

7.4 Limitations of the study

The study was based on the local resident's activism, which was not captured or documented properly over the two decades. In addition, limited documentation was available on the change of ownership of Colbyn Valley Wetland and its extent dating back to the mid-19th century. For this reason, the study had to rely on the personal memory of participants. This means errors or omissions could also have occurred during the sharing of stories. The study ensured it reached a wide number of primary participants to minimise such mistakes. The study also understood that the government officials are not always allowed to provide details of decisions that were not yet finalised during the study, such as the financial commitment that the provincial authority were making to the site over a long run. Such restriction might make it difficult to understand the level of commitment by provincial authority to safeguarding crucial resources found in the site.

To ensure the limitations did not discredit the study, the researcher ensured that the primary stakeholders who were participating in the questionnaire were registered members of the FoCV and is participants in the activities of the wetland. This was done to avoid having members with little knowledge about the wetland giving an opinion about the site. The secondary and tertiary stakeholders were also allowed to seek approval from their respective employers to ensure that there is an institutional commitment and the responses are approved as credible.

7.5 Resolution of the research questions

A set of research questions guided the case study and this section summarises the answers to the questions of the research.

7.5.1 What are the key factors attracting stakeholders to the wetland?

i. The need to secure a critical water resource

The partnership of many stakeholders has ensured the future of a critical wetland and the indigenous fauna and flora found at Colbyn Valley Wetland is secured. The loss of this wetland would have impacted negatively, not only the indigenous fauna and flora found on the site, but also on the Hartebeespruit River catchment that feeds into the Roodeplaat Dam which supplies water to the city of Pretoria. The dam would have an altered stream inflow due to the degradation of the wetland. The Colbyn Valley Wetland provides various ecosystem goods and services to the local residents such as providing drinking water to the Roodeplaat Dam and a good site for birdwatching. The critical wetland and its connection with other ecosystems attracted concerned stakeholders who then came together to protect the site.

ii. A convenient location for stakeholders

The Colbyn Valley Wetland is geographically located in a position that made it easy for all the stakeholders to access it and come together to protect it. It is an easy site to commit to by financially constrained institutions such as government since the site is within a close range to their head offices. There were minimal logistical challenges for stakeholders to access the Colbyn Valley Wetland. Most of the stakeholders lived or worked near it and there is an efficient transport network connecting people to the wetland. This made it easy for meetings to be held and for local residents to participate.

iii. The need to protect the wetland from property developers

The Colbyn Valley Wetland faced huge pressures from property developers who wanted to convert the wetland into commercial and residential property. The wetland was already degraded by a railway line that continues to destabilise the functionality of the affected portion of the wetland.

iv. Strong support from local residents

The local residents were the founding stakeholders in the protection of the wetland. Their bold support for the wetland made it easier for other stakeholders to come on board. As the literature review highlighted, lack of support from local residents for protection of wetlands and associated ecosystem is the reason for failure of many protected sites. Thus, Colbyn presented a very different situation where the local residents and their activism ensured that additional stakeholder were welcomed. The local residents also helped to look after the safety of staff deployed to work at the site.

7.5.2 What is the role of each stakeholder in the protection of the Colbyn Valley Wetland?

v. Primary stakeholders

The study found that the role of primary stakeholders was to mobilise local residents to support the protection of the Colbyn Valley Wetland. The local residents petitioned the government to protect the wetland before it could be converted to an alternative land use. They further organised programmes to empower local people with knowledge about wetlands. This includes commemoration of certain wetland-related calendar dates.

vi. Secondary stakeholders

The study found that the role of the secondary stakeholder (GDARD) was to facilitate the declaration of the Colbyn Valley Wetland as a nature reserve. This included post-declaration management support. The role of GDARD included conducting an assessment of the ecosystems found on the site to determine the appropriate management measures. The department also continues to oversee basic auditing and planning for the site, linking it with other existing critical wetland areas in the Hartbeesspruit catchment.

vii. Tertiary stakeholders

The study found that the role of the tertiary stakeholders was to support the efforts to protect the Colbyn Valley Wetlands. They influence and enable stakeholders by providing resources to manage the wetlands. This includes post-declaration support for the management of the wetland. They also conduct various training and skills development for all parties with an interest in the wetland. They support programmes to empower local residents with knowledge on wetland functions and maintenance.

7.5.3 What is enabling this partnership of stakeholders in the protection of the wetland?

There are a number of governance values that are enabling this partnership of stakeholders in the Colbyn Valley Wetland. These values are:

i. Policy

The Biodiversity Management Plan for Ecosystems for Colbyn Valley Wetland states each stakeholder is assigned responsibility, and that mutual respect supports this allocation of duties (DEA, 2016). The stakeholders, regardless of their political or administrative powers, understand that other stakeholders are equally important in the management of Colbyn Valley Wetland.

ii. No vested financial interests

The study showed little personal gain for stakeholders, particularly from local residents who are interested in the protection of Colbyn Valley Wetland for the greater good. This makes it easier to support each other in fulfilling the responsibilities. There are no stakeholders that feel burdened by the responsibilities assigned to them in the management of the wetland.

iii. Consultation

No decision gets taken without the consultation with all the stakeholders, as was highlighted in the Biodiversity Management Plan for Ecosystems of Colbyn Valley Wetland (DEA, 2016). All the stakeholders are afforded an opportunity to raise their views on every decision.

This process enables consensus to be reached while maintaining a focus on the bigger picture, which is the protection and proper management of the Colbyn Valley Wetland.

iv. Competency

All the stakeholders have a minimal understanding and competency required to play their role in managing the wetland. Those that do not are able to attend the training and workshops, provided mainly by tertiary stakeholders, to train people about wetland basics.

7.5.4 Are there any returns on investment for these stakeholders?

The study did not find evidence of any monetary gains by any stakeholders. This is a voluntary partnership by all stakeholders without any form of compensation being paid. It must be noted however, that the protection of Colbyn Valley Wetland was a significant milestone for each stakeholder. The primary stakeholders believe the protection of Colbyn Valley Wetland reflected the power of organised local residents. The secondary stakeholders found the declaration of Colbyn Valley Wetland to be an important milestone in meeting ecosystem protection targets for wetlands, as well as targets for the protection of the Marikana Thornveld ecosystem type. The tertiary stakeholders were happy to see the initiative they were part of becoming a success. This was achieved through separate roles that each stakeholder played as shown in Table 7.1.

Table 7.1: Summary of stakeholder approaches to protecting the Colbyn Valley Wetland.

Stakeholder	Goal	Approach
Primary: local residents	Protect the wetland and wetland biodiversity, while ensuring access to ecosystem goods and services	Mobilisation of local residents to collaborate with government for protection of Colbyn Valley Wetland.
Secondary: government departments, state parastatals and agencies	Protection of threatened vegetation type (Marikana Thornveld) and threatened wetland ecosystems.	Declaration of Colbyn Valley Wetland as a nature reserve.
Tertiary: research institutions, non-government organisations, private business/philanthropists	Convenient site for corporate social investment, academic projects, pilot studies on wetland and associated ecosystems.	Initiate projects inside of Colbyn Valley Wetland, and support initiatives of the FoCV and government.

7.5.5 What transferable lessons can be learnt from the Colbyn Valley Wetland Nature Reserve and stakeholders?

The case study identified the following lessons that may be useful in other similar situations:

i. State institutions with mandate to protect wetlands need support

The case of Colbyn Valley Wetland is evidence that state institutions with mandates to protect wetlands need the support of all interested and affected parties. These institutions are often constrained financially, and lack capacity and political will. These constraints make it difficult for them to perform effectively in protecting wetlands. The support given by stakeholders at the Colbyn Valley Wetland has made it easier for mandated government institutions to do their best to ensure the wetland is protected.

ii. It is possible to protect wetlands in the face of competing land use

The City of Tshwane, like many others, is growing fast and the demand for land is high (City of Tshwane, 2013). It is unfortunate that the land upon which the growth is taking place

include areas with sensitive wetlands that should be protected for sustainability and ecological benefits. The protection of Colbyn Valley Wetland in the face of competing land uses is proof that it is possible to secure a critical wetland ecosystem in a city. All it takes is for all interested and affected parties to work together.

iii. Lack of money is not an excuse for loss of wetlands

The protection of the Colbyn Valley Wetland is a proof that even development pressures with strong financial incentives can be overcome. The stakeholders at Colbyn Valley Wetland worked together despite a lack of sustainable financial resources. They used resources that were at their disposal to advance the interest of the Colbyn Valley Wetlands. This is one of the reasons why Colbyn Valley Wetland is protected today.

iv. Organised communities are effective in achieving results

Many studies have found that local residents must be part of the protection of wetland community. Ignoring the values and interests of local people puts wetlands at risk of loss. The Colbyn Valley Wetland was first proposed for protection by local residents. They petitioned City of Tshwane council to stop selling the site of the wetland or changing its land use. This resistance from local communities has proven that the role of local residents is equally important in a city or rural landscape.

v. Dialogue of interested parties

The protection of wetlands should not end when the fence is erected. There must be lively activities taking place on the site, as well as enabling members of the community to access the site. All the stakeholders must continue dialogues to improve the status and quality of the wetland community under protection. There must be a continuous engagement with experts in the field of wetlands.

7.6 Recommendations

This study has found the following to be key issues that still need to be addressed:

7.6.1 Updating species and ecosystem data

South Africa is struggling to stop the continued loss of wetland ecosystems despite their importance for water security. This is worsened by the lack of data about the occurrence of these ecosystems, making it difficult for the country to respond speedily to the loss (Driver *et al.,* 2012). The petitions for the protection of Colbyn wetland were based on scientific information collected over 10 years ago. This information may not be relevant today since species migrate and patterns fluctuate depending on various biophysical factors. Since the

Colbyn Valley Wetland has been under external pressure, a number of species may have been lost. It is necessary that stakeholders appoint a team of experts to modernise the existing knowledge about the Colbyn Valley Wetlands in relation to the species found on the site.

7.6.2 Regular meeting to review and monitor of the wetlands

The management of a wetland must include a programme to monitor the ecological quality of the wetland ecosystem. Wetland quality monitoring is recommended as it can help identify challenges and possible solutions before they become overwhelming to the ecosystem (Ramsar Convention Secretariat, 2010a). The stakeholders at Colbyn Valley Wetland should establish a technical committee to regularly review the ecological quality of the wetland. The committee must identify areas that need improvement for the wetland to remain beneficial to people and provide water to the Hartbeesspruit catchment.

7.6.3 Fair allocation of responsibility among stakeholders

The success of stakeholder-driven projects is measured by the result and not necessarily by the effort of each stakeholder involved (Ommen, Blut, Backhaus & Woisetschläger, 2016). Ommen *et al.* (2016) state that there are some stakeholders who put in more effort than others to ensure a project is successful. This was true for Colbyn as well, but it may have been due to some stakeholders being poorly engaged. Thus, it is recommended that the stakeholders at Colbyn Valley Wetland must ensure that there is a process to acknowledge the progress made by each stakeholder on the allocated assignments. This is to minimise difficulties of having some stakeholders giving more support to the site than others. There must always be a fair allocation of responsibility, with reasonable time limits, to ensure all the stakeholders perform to the best of their ability.

7.6.4 Encourage wide representation from a marginalised community

The lack of representation by certain social groups of the community may be a reflection of difference in what people value most in their lives or what their condition of living allows them to do (Caffrey & Carew, 2012). Caffrey and Carew (2012) state that it is necessary for those who are less represented to be afforded an opportunity to express themselves and the support they require to be part of initiatives of good cause. The stakeholders involved in the Colbyn Valley Wetland must work to try and mobilise other less represented communities surrounding the site. This will ensure they understand the bigger purpose and not think it

belongs to a certain class of society. A programme to reach out to the less represented must be supported by all stakeholders regardless of their key interest on the site.

7.6.5 Strengthen security to prevent criminals

The continuous trespassing on Colbyn Valley Wetland by homeless people may accommodate criminals who cause safety concerns to the surrounding suburbs. This may force some local residents to withdraw their support for the protection of the wetland, since it is a habitat for criminals. The stakeholders must also work with other structures in the communities who assist homeless people with shelter and food to avoid them using the Colbyn Valley Wetland as a refuge.

7.6.6 Stakeholders must identify areas of mutuality in protecting wetland

The case study demonstrates that it is possible to protect wetland and associated ecosystems in the face of competing land uses in cities (UNEP & UN-HABITAT, 2005). However, this requires all parties to voluntarily identify with the proposed conservation initiative regardless of their business focus. This case study has shown that various institutions from a variety of backgrounds, including those who are not necessarily conservationists, found relevance in the project.

The stakeholders are encouraged to investigate other sources of financial support, for example from corporate social responsibility investment or funding from other relevant non-conservation NGOs. The corporate social responsibility expenditure as determined by the Income Tax Act [Act 58 of 1962] must explicitly consider initiatives that protect the critical wetland and associated ecosystems. This must be supported by science-based evidence on the role of the wetland and healthy ecosystems to people, water provision, climate adaptation as well as disease prevention. This will motivate institutions that do not have wetland conservation as core business focus areas to support programmes that protect wetlands. This must also be extended to non-taxed institutions such as religious bodies, which have responsibilities to protect wetlands with resources collected from their congregants or followers.

7.6.7 Wetland protection is also part of service delivery to communities

The local residents understood the importance of the Colbyn Valley Wetland in their lives. The protection of wetlands for the benefit of all remains a key feature in the National Water Act [Act 36 of 1998]. It is unfortunate that local communities often only resort to challenging

government when there is no provision of certain basic services such as water and health facilities (CoGTA, 2009). There are very few cases of community standing up together to protect wetlands. The Colbyn Valley Wetland reaffirms the need for local communities to take a stand against wetland exploitation. The local communities must not only wait for the government to protect the wetland but should be involved in the whole process.

There must be a development of a broad service delivery charter by all the stakeholders which includes the protection of wetlands that guides local communities on their role. This must be supported by local community structures with wide representation of all communities.

7.6.3 Strengthen localised research studies

The loss of wetlands is a global problem reflected in the international literature (UNEP & UN-HABITAT, 2005). However, it is very difficult to find scientific papers published about the sites protected for wetlands in the City of Tshwane. This is also compounded by the old scientific survey of flora and fauna found on the site, making it impossible to draw appropriate conclusions. In some cases, only popular articles with minimal scientific evidence are published in mainstream media. These articles focus on specific issues but are not necessarily based on scientific understanding of the problem in question.

The higher learning institutions must continue to identify key research topics at wetland sites in the city that can be used to motivate for academic research funding (such as funding calls from the National Research Foundation and others). The city council must support this to ensure there is enough support from the municipality and willingness to co-operate during the studies. The local universities must be urged to prioritise local wetland sites before looking elsewhere for research topics.

7.7 Main contributions of this case study to understanding stakeholder engagement in an urban wetland

This case study has contributed to understanding why stakeholders are willing to engage in wetland conservation in an urban area. Among many other results detailed above, some of the most interesting findings of this case study were an improved understanding about:

7.7.1 Ability of stakeholder groups to recover from setbacks when some stakeholders are not interested

The early 1990s saw the primary stakeholders formally coming together to call for the wetland to be protected. Their activism lasted for over two decades before the site was formally protected. This call was never heeded with a formal response from the government authority until interdicts required compensation for the damage that developers were causing on the part of the wetland. Had the government responded immediately, it would have prevented construction of, for example, the railway line that altered the wetland.

7.7.2 Improved understanding of the personal sacrifices that stakeholders make for the wetland

The division of labour amongst Colbyn Valley Wetland stakeholders was remarkable and has helped in sharing management needs and resources required by the site. The volunteers use their skills, money and assets to support the maintenance of the wetland which is done through a co-ordinated process. This support would not have been possible if it was not for the good relationships between stakeholders.

7.7.3 Challenging the existing prioritisation process for government on protection of wetlands and related ecosystems

The continuous focus on achieving hectare-based targets made it difficult for Colbyn Valley Wetlands to be protected, because it is small compared to other less pressured but bigger wetlands in Gauteng Province. This has forced government to pay more to restore and recover the functionality of the wetland through building of gabions which could have been avoided had the wetland been prioritised earlier (Figure 7.1).

Figure 7.1: Gabion built at Colbyn Valley Wetland supported by Working for Wetlands Programme, a programme of the Department of Environmental Affairs (Source: Author, 2017).

7.7.4 Witnessing minimal political identity from all stakeholders

The role of stakeholders at Colbyn Valley Wetland is informed by the needs of the wetland and not of politicians. They were working together for the wetland and always accommodated every person from any political background as long they are in partnership to conserve the wetlands. Even the local ward councillor was not directly involved in the affairs of the wetlands. During the meeting proceedings, the stakeholders set their own agenda which guided them in their work to protect the wetlands.

7.8 Conclusion

This case study has met its objectives and remained independent throughout the investigation. The study has also provided recommendations on areas that need further intervention, particularly on the relationship between institutions and individuals with no wetland mandate or interest to support conservation initiatives. This will minimise legal battles suffered when parties cannot agree on the compatible land use for wetland sites.

The protection of wetlands across the City of Tshwane must not only focus on the larger scales, but also the smaller wetlands, to ensure all wetlands are protected. There is also a need to strongly emphasise that wetlands which do not necessarily form part of the National Freshwater Ecosystems Priority Areas (NFEPA), may still have a role in the City's ecological infrastructure that underpins development and water provisioning. The engagement of stakeholders has proved to be productive in providing necessary support in initiatives that are mostly the responsibility of the government.

REFERENCES

Aapaoja, A. & Haapasalo, H. (2014). A Framework for Stakeholder Identification and Classification in Construction Projects. *Open Journal of Business and Management*. 2: 1- 13. http://file.scirp.org/Html/7-1530038_42090.htm [Accessed 08 October 2017]

Achyar, E., Schmidt-Vogt, D. & Shivakoti, G (2015). Dynamics of the multi-stakeholder forum and its effectiveness in promoting sustainable forest fire management practices in South Sumatra, Indonesia. *Journal of Environmental Development*. 13: 4–17. http://www.sciencedirect.com/science/article/pii/S2211464514000839 [Accessed 24 September 2015]

Active Learning Network for Accountability and Performance in Humanitarian (ALNAP). (2003). *Participation by Crisis-Affected Populations in Humanitarian Action: A Handbook for Practitioners*. Part 1-3. (London: Overseas Development Institute) http://www.alnap.org/pool/files/gs-handbook-draft.pdf [Accessed 24 September 2015].

Aggestam, F. (2014). Wetland Restoration and the Involvement of Stakeholders: An Analysis Based on Value-Perspectives, *Landscape Research*, 39:6, 680-697. http://www.tandfonline.com/doi/abs/10.1080/01426397.2013.819076 [Accessed 24 September 2015].

Andrade, G.S.M. & Rhodes J.R. (2012). Protected areas and local communities: an inevitable partnership toward successful conservation strategies? *Ecology and Society* 14:4-17. https://www.ecologyandsociety.org/vol17/iss4/art14/ [Accessed 24 September 2015].

Ansong, M. & Røskaft, E., (2011). Determinants of attitudes of primary stakeholders towards forest conservation management: a case study of Subri Forest Reserve, Ghana, *International Journal of Biodiversity Science, Ecosystem Services & Management*, 7:2, 98-107. http://www.tandfonline.com/doi/abs/10.1080/21513732.2011.613411 [Accessed 24 September 2015].

ARC. (2014). *Media Release: information sharing on wetlands and invasive weed control at the Colbyn valley wetland*. Issued 19 February 2014. http://www.arc.agric.za/arc-iscw/Press%20Release%20Library/Media%20Release%20-%20Wetlands%20event.pdf [Accessed 11 January 2018]

ARC. (2009). *News release: Wetlands and our Environment*. Issued 17 February 2009. http://archive.ramsar.org/pdf/wwd/9/wwd2009_rpts_southafrica.pdf [Accessed 11 January 2018]

Bennett, N.J. & Dearden, P. (2014). Why local people do not support conservation: Community perceptions of marine protected area livelihood impacts, governance and management in Thailand. *Journal of Marine Policy*, 44, 107–116. https://www.sciencedirect.com/science/article/pii/S0308597X13001711?via%3Dihub [Accessed 10 March 2017.

BirdLife International. (2017). *IUCN Red List for birds.* http://datazone.birdlife.org/species/factsheet/22718890 [Accessed 12 November 2017]

BirdLife International. (2016). Asio capensis. *The IUCN Red List of Threatened Species* e.T22689535A93235768. http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22689535A93235768.en

Bob, U. & Bronkhorst, S. (2010). Environmental conflicts: Key issues and management implications. *African Journal on Conflict Resolution*, 10, 9-30. http://www.sciencedirect.com/science/article/pii/S0308597X14001353 [Accessed 24 September 2015].

Blom, L. (2016). Waste Management in Education - Grade 8 and 9. Department of Environmental Affairs and Development Planning. http://wastemanagement.edendm.co.za/wp-content/uploads/2016/10/Gr8-9_TEXT_English.pdf [Accessed 20 January 2018]

Bobbink, R., Beltman, R., Verhoeven, J.T.A. & Whigham, D.F (Eds.). (2006). *Wetlands: Functioning, Biodiversity Conservation, and Restoration*. Ecological Studies, Vol. 191. http://link.springer.com/book/10.1007%2F978-3-540-33189-6 [Accessed 21 May 2017]

Borrini-Feyerabend, G., Kothari, A. and Oviedo, G. (2004). *Indigenous and Local Communities and Protected Areas: Towards Equity and Enhanced Conservation.* IUCN, Gland, Switzerland and Cambridge, UK. http://www.iccaconsortium.org/wp-content/uploads/Guidelines-11.pdf [Accessed 23 May 2016].

Boyce, C., & Neale, P. (2006). Conducting in-depth written interviews: a guide for designing and conducting in-depth written interviews for evaluation input. *Monitoring and Evaluation – 2. Pathfinder International Tool Series.* http://www2.pathfinder.org/site/DocServer/m_e_tool_series_indepth_written interviews.pdf [Accessed 26 June 2016].

Bradley, M.A & Harrel, M.C. (2009). *Data collection methods semi-structured written interviews and focus groups.* Prepared for the U.S. Government. RAND Corporation. http://www.rand.org/content/dam/rand/pubs/technical_reports/2009/RAND_TR718.pdf [Accessed 28 June 2016].

Cadman, M., Petersen, C., Driver, A., Sekhran, N., Maze, K. & Munzhedzi, S. (2010). *Biodiversity for Development: South Africa's landscape approach to conserving biodiversity and promoting ecosystem resilience*. South African National Biodiversity Institute, Pretoria. https://cmsdata.iucn.org/downloads/primer_11_2_mb.pdf [Accessed 23 May 2016].

Caffrey, B.M & Carew, P.J. (2012). A Limited Engagement: A Case Study in Using Contextualised Online Learning Environments to Engage with Marginalised Communities. *IFAC Proceedings* Volume. 45, 10: 165-170.

Calhoun, A.J.K., Mushet, D.M., Bell, K.P. Boixd, D. Fitzsimons, J.A. & Isselin-Nondedeu, F. (2016). Temporary wetlands: challenges and solutions to conserving a 'disappearing' ecosystem. *Biological Conservation.* https://doi.org/10.1016/j.biocon.2016.11.024 [Accessed 21 May 2017]

Chaikumbung, M., Doucouliagos, H & Scarborough, H. (2016). The economic value of wetlands in developing countries: A meta-regression analysis. *Journal of Ecological Economics.* 124, 164–174. http://dx.doi.org/10.1016/j.ecolecon.2016.01.022 [Accessed 15 March 2017].

Chatterjee, A., Phillips, B. & Stroud, D.A. (2008). *Wetland Management Planning. A guide for site managers*. WWF, Wetlands International, IUCN & Ramsar Convention. 76pp. assets.panda.org/downloads/wetlands_management_guide_2008.pdf [Accessed 13 May 2017]

Chenchen, H., Hanb, Q., de Vries, B., Wanga, X., Guochao, Z. (2013). Evaluation of sustainable land management in urban area: A case study of Shanghai, China. *Ecological Indicators.* 80: 106–113.

Ciocănea, C.M., Sorescu, C., Ianoși, M., Bagrinovschi, V. (2016). International Conference – Environment at a Crossroads: SMART approaches for a sustainable Future Assessing public perception on protected areas in Iron Gates Natural Park. *Procedia Environmental Sciences*. 32: 70 – 79.

City of Tshwane. (2013a). *Regional Spatial Development Framework.* http://www.tshwane.gov.za/sites/Departments/City-Planning-and-Development/Draft%20RSDF%202012/RSDF%20Region%203.pdf [Accessed 24 October 2017]

City of Tshwane. (2013b). *Tshwane Vision 2055: Remaking South Africa's Capital City.* City of Tshwane. Pretoria. http://www.tshwane2055.gov.za/images/vision/online_version-cot_2055_vision-v2.pdf [Accessed 16 March 2016].

City of Tshwane. (2014). *Region 3: Regional Integrated Development Plan 2014-15. Accelerated Service Delivery Implementation: Regionalisation & Transformation Strategic Plan 2012 – 2016*. [Accessed 24 October 2017]

CoGTA. (2009). *State of Local Government in South Africa: Overview Report*. National State of Local Government Assessments. Working Document. http://www.gov.za/sites/www.gov.za/files/state-local-gov-rpt1.pdf [Accessed 16 April 2016].

De Leon, R.C & Kim, S. M. (2017). Stakeholder perceptions and governance challenges in urban protected area management: The case of the Las Piñas – Parañaque Critical Habitat and Ecotourism Area, Philippines. *Land Use Policy*. 63: 470-480. http://www.sciencedirect.com/science/article/pii/S0264837716309590 [Accessed 01 October 2017]

DEA. (2016). *Draft biodiversity management plan for Hartbeesspruit ecosystem.* Department of Environmental Affairs. Pretoria. http://cer.org.za/wp-content/uploads/2010/05/Draft-Biodiversity-Management-Plan-for-Hartbeesspruit-Ecosystem.pdf [Accessed 04 April 2017]

DEA and SANBI. (2016). *Strategic Framework and Overarching Implementation Plan for Ecosystem-Based Adaptation (EbA) in South Africa: 2016 – 2021*. Department of Environmental Affairs, Pretoria, South Africa. https://www.sanbi.org/sites/default/files/documents/documents/final-strategic-framework-and-overarching-implementation-plan-eba-south-africa.pdf [Accessed 30 October 2017]

Department of Environmental Affairs and Development Planning. (2007). Provincial Guideline on Biodiversity Offsets. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town. https://www.westerncape.gov.za/text/2007/3/pgwcoffsetsguidelinedraft_5march_07.pdf [accessed 21 January 2018]

Department of Water and Sanitation (DWS). (2013). *National Water Resource Strategy 2: water for an equitable and sustainable future*. Second edition. http://www.dwa.gov.za/documents/Other/Strategic%20Plan/NWRS2-Final-email-version.pdf [Accessed 21 December 2017]

Department of Water Affairs and Forestry (DWAF). (2008). *Resource Management Plan for Roodeplaat Dam*. PROJECT 2006-304: REPORT 4: RMP. http://www.dwa.gov.za/Documents/Other/RMP/Roodeplaat/RoodeplaatDam.pdf [Accessed 21 January 2018]

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.* Synthesis Report. South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria. http://catalog.ipbes.net/system/assessment/195/references/files/570/original/NBA_2011_Synthesis_Report_%28low_resolution%29.pdf?1364385861 [Accessed 16 March 2016].

Du Martins, P. (2015). *Colbyn wetlands safe after community action.* https://rekordeast.co.za/41142/colbyn-wetlands-safe-after-community-action/ [Accessed 7 March 2017]

Du Martins, P. (2014). *Proposed Colbyn wetland sale vehemently opposed*. https://rekordmoot.co.za/28789/proposed-colbyn-wetland-sale-vehemently-opposed/ [Accessed 28 October 2017].

Dudley, N. (2008). *Guidelines for Applying Protected Area Management Categories*. Gland, Switzerland: IUCN. x + 86pp. Chapter 1 – 4. http://www.cropwildrelatives.org/fileadmin/templates/cropwildrelatives.org/upload/In_situ_Manual/Guidelines%20for%20Applying%20Protected%20Area%20Management%20Categories,%20IUCN.pdf [Accessed 16 April 2017]

Ellis, E.C. (2013). Sustaining biodiversity and people in the world's anthropogenic biomes. *Current Opinion in Environmental Sustainability*. 5 (3–4), 368-372. https://doi.org/10.1016/j.cosust.2013.07.002 [Accessed 29 December 2017]

FoCV Facebook Page. (2014) Stop selling the Colbyn Wetland posted on 15 November 2014. https://web.facebook.com/113301492142149/photos/a.274589189346711.1073741829.113301492142149/477416929063935/?type=3 [Accessed 15 September 2017]

FAO. (2011). *The state of the world's land and water resources for food and agriculture (SOLAW) – Managing systems at risk.* Food and Agriculture Organization of the United Nations, Rome and Earthscan, London. http://www.fao.org/docrep/017/i1688e/i1688e.pdf [Accessed 21 May 2017]

Fish, L., (2004). *Themeda triandra Forssk.* SANBI: Plants Africa. National Herbarium, Pretoria http://pza.sanbi.org/themeda-triandra. [Accessed 24 October 2017]

Fish, L., Mashau, A.C., Moeha, M.J & Nembudani, M.T. (2015). *Identification guide to Southern African Grasses. An identification manual with keys, descriptions and Distributions. Strelitzia 36*. South African National Biodiversity Institute, Pretoria. https://www.nhbs.com/identification-guide-to-southern-african-grasses-book [Accessed 24 October 2017]

Green, L.W. & Mercer, S.L. (2001). Can public health researchers and agencies reconcile the push from funding bodies and the pull from communities? *Journal of Public Health*. Vol 91(12):1926-9. [Accessed 21 December 2017]

Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research. *The Qualitative Report*, 8(4), 597-606. http://nsuworks.nova.edu/tqr/vol8/iss4/6 [Accessed 17 January 2017].

Gauteng Provincial Gazette 126. (2014). *National Environmental Management: Protected Areas Act (57/2003): Declaration of an area as the Colbyn Wetland Nature Reserve. NOTICE 1972 OF 2014 (126).* http://www.gpwonline.co.za/Gazettes/Gazettes/166_25-6-2014_Gaut.pdf [Accessed 16 September 2014]

GDARD & SANBI. (2013). *Gauteng Protected Area Expansion Strategy*. This strategy was compiled by Sustainable Innovations on behalf of the South African National Biodiversity Institute and the Gauteng Department of Agriculture and Rural Development. http://biodiversityadvisor.sanbi.org/wp-content/uploads/2016/09/Gauteng-PAES-Report-September-2013.pdf [Accessed 30 December 2017]

Government Gazette No. 19957. (1999). Statistics Act 6 of 1999. http://www.saflii.org/za/legis/num_act/sa1999150.pdf [Accessed 9 October 2016].

Government Gazette No. 26019. (2003). Local Government: Municipal Finance Management Act 56 of 2003. http://www.saflii.org/za/legis/hist_act/lgmfma56o2003418/lgmfma56o2003a1j2004519.pdf[Accessed 28 June 2016].

Government Gazette No. 26436. (2004). No. 10 of 2004: National Environmental Management: Biodiversity Act, 2004. Vol. 467. https://www.environment.gov.za/sites/default/files/legislations/nema_amendment_act10.pdf [Accessed 16 April 2017]

Government Gazette No. 26436. (2004). National Environmental Management: Wetland Act, No. 10 of 2004. http://www.nda.agric.za/docs/NPPOZA/NEMBA.pdf [Accessed 25 September 2017]

Government Gazette No. 35486. (2012). Publication of Norms and Standards for Biodiversity Management Plans for governments. NOTICE 532 OF 2012 http://www.gpwonline.co.za/Gazettes/Gazettes/35486_2-7_EnvAffairs.pdf [Accessed 25 September 2017]

Government Gazette No. 36730. (2013). Spatial Land Use Management Act of 2013 http://faolex.fao.org/docs/pdf/saf138250.pdf [Accessed 28 June 2016].

Government Gazette No. 34809. (2011). National Environmental Management: Biodiversity Act (1 0/2004): National list or ecosystems that are threatened and in need of protection. http://biodiversityadvisor.sanbi.org/wp-content/uploads/2012/10/20111209-National-Gazette-No-34809-of-09-December-2011-Volume-558.pdf [Accessed 25 September 2017]

Government of South Africa. (2010). National Protected Area Expansion Strategy for South Africa 2008: Priorities for expanding the protected area network for ecological sustainability and climate change adaptation. https://www.environment.gov.za/sites/default/files/docs/nationalprotected_areasexpansion_strategy.pdf

[Accessed 29 September 2017]

Government of South Africa. (2015). National Biodiversity Strategy and Action Plan, Department of Environmental Affairs, Pretoria. https://www.cbd.int/doc/world/za/za-nbsap-v2-en.pdf [Accessed 22 July 2018]

Grimble, R. (1998). *Stakeholder methodologies in natural resource management. Socioeconomic methodologies*. Best Practice Guidelines. Chatham, UK: Natural Resources Institute. https://www.commdev.org/userfiles/files/2011_file_BPG02.pdf [Accessed 20 January 2018]

Grundling P & Marneweck, G. (2000). *Proposed rehabilitation of the railway at the poort section in the Colbyn Valley Wetland* (slope failure at 8.8 KM Hartbeesfontein – Koedoespoort). Preliminary study. Wetland Consulting Services (PTY.) Ltd. Report Ref: COL01/35/200.

Heale, R & Twycross, A. (2015). Validity and reliability in quantitative studies. Evidence-Based Nursing. *British Medical Journals*. 18:66-67. http://dx.doi.org/10.1136/eb-2015-102129[Accessed 03 June 2017]

Herr, D. T. Agardy, D. Benzaken, F. Hicks, J. Howard, E. Landis, A. Soles and T. Vegh (2015). *Coastal "blue" carbon. A revised guide to supporting coastal wetland*

programs and projects using climate finance and other financial mechanisms. Gland, Switzerland: IUCN.

Hesselink, F., Goldstein, W., van Kempen, P.P., Garnett, T & Dela, J. (2007). *Communication, Education and Public Awareness, a toolkit for the Convention on Biological Convention*, Montreal. https://www.cbd.int/cepa/toolkit/2008/doc/CBD-Toolkit-Complete.pdf [Accessed 14 September 2017]

Hlahla, P. (2012). Colbyn residents cry foul over threat to wetland. Pretoria News. https://www.iol.co.za/pretoria-news/colbyn-residents-cry-foul-over-threat-to-wetland-1309142. [Accessed 20 January 2018]

Hofmann, A. (2011). Transvaal Supergroup, South Africa. *Encyclopaedia of Astrobiology*. 1709-1709. https://link.springer.com/referenceworkentry/10.1007%2F978-3-642-11274-4_1609.[Accessed 24 October 2017]

Hu, S., Niu, Z., Chena, Y., Li, L. & Zhang, H. (2017). Global wetlands: Potential distribution, wetland loss, and status. *Science of the Total Environment*. 586, 319–327. http://dx.doi.org/10.1016/j.scitotenv.2017.02.001. [Accessed 15 March 2017]

Huang, Y.Y, Cho, S.T, Haryono, M., Kuo, C.H. (2017). Complete chloroplast genome sequence of common bermudagrass (Cynodon dactylon (L.) Pers.) and comparative analysis within the family Poaceae. *PLoS One.*12:6. *https://www.ncbi.nlm.nih.gov/pubmed/28617867* [Accessed 24 October 2017]

International Peat Society. (2010). *Strategy for Responsible Peatland Management.* Saarijärven Offset, Saarijärvi. Adopted at a stakeholder seminar in Amsterdam in October 2010. Donal Clarke and Jack Rieley (Eds). Saarijärven Offset, Saarijärvi, December 2010 (2nd edition) http://www.peatsociety.org/sites/default/files/files/srpmwebversion.pdf [Accessed 23 July 2016].

International Water Management Institute. (2014). *Wetlands and people*. Colombo, Sri Lanka. http://www.iwmi.cgiar.org/Publications/Books/PDF/wetlands-and-people.pdf [Accessed 23 May 2016].

Jha, A.K., Barenstein, J.D., Phelps, P.M., Pittet, D. & Sena, S. (2010). *Safer Homes, Stronger Communities: A Handbook for Reconstructing after Natural Disasters.* The

International Bank for Reconstruction and Development/World Bank. http://www.gfdrr.org/sites/gfdrr.org/files/Front_Matter.pdf [Accessed 23 July 2016].

Jones, K., Lanthier, Y., van der Voet, P., van Valkengoed, E., Taylor, D. & Fernández-Prieto, D. (2009). Monitoring and assessment of wetlands using Earth Observation: The "GlobWetland" project. *Journal of Environmental Management.* *http://www.sciencedirect.com/science/article/pii/S0301479708000364* . 90,2154–2169.

Kroll, C. (2000). School Group Spearheads Rehabilitation of urban Wetland/Peatland. *Urban Green file*. July/August 2000. Hardcopy supplied by Tamsyn Sherwill, Secretary of the FoCV.

Kyalangalilwa, B., Boatwright, J.S., Daru, B.H. Maurin., O. & Van Der Bank, M. (2013). Phylogenetic position and revised classification of Acacia s.l. (Fabaceae: Mimosoideae) in Africa, including new combinations in Vachellia and Senegalia. *Botanical Journal of the Linnean Society*. 2013, 172, 500–523. https://academic.oup.com/botlinnean/article-pdf/172/4/500/14087546/boj12047.pdf

Lai, Q. (2003). Community participation in the management of nature reserves: experiences and lessons from China. *Unasylva (a multilingual international journal of forestry and forest industries published by Food and Agriculture Organization).* 214/215, Vol. 54. http://www.fao.org/3/a-y5189e/y5189e08.pdf [Accessed 24 July 2016].

Lockwood, M. (2010). Good governance for terrestrial protected areas: A framework, principles and performance outcomes. *Journal of Environmental Management.* 91. 754–766.

Le Roux, L. (2003). *Combretum erythrophyllum* (Burch.) Sond. SANBI: Plant Africa. Lowveld National Botanical Garden. http://pza.sanbi.org/combretum-erythrophyllum [accessed 24 October 2017]

Mack, N., Woodsong C., Macqueen, K. M., Guest, G. & Namey, E. (2005). *Qualitative research methods: a data collector's field guide*. Family Health International. https://www.fhi360.org/sites/default/files/media/documents/Qualitative%20Research%20Methods%20-%20A%20Data%20Collector's%20Field%20Guide.pdf [Accessed 17 January 2017].

Macfarlane, D., Holness, S.D., von Hase, A., Brownlie, S. & Dini, J. (2014). *Wetland offsets: a best-practice guideline for South Africa*. South African National Biodiversity Institute and the Department of Water Affairs. Pretoria. http://www.wrc.org.za/Pages/DisplayItem.aspx?ItemID=11746&FromURL=%2FPages%2FDefault.aspx%3Fdt%3D%26ms%3D%26d%3DWetland+offsets%3A+A+best+practice+guideline+for+South+Africa%26start%3D1 [Accessed 21 February 2018]

Madzivhandila, T.S & Asha, A.A. (2012). Integrated development process and service delivery challenges for South Africa's local municipalities. *Journal of Public Administration*, Special issue 1: 47.369-378. https://journals.co.za/content/jpad/47/si-1/EJC121934

Maretti, C.C. (2003). *Protected areas and indigenous and local communities in Brazil.* Preliminary version 2. http://cmsdata.iucn.org/downloads/cca_cmaretti.pdf [Accessed on 24 July 2016].

Mashamaite, K. (2014). Public Service Delivery Protests in a Democratic South Africa: A Dilemma for Local Municipalities. *Mediterranean Journal of Social Sciences*. 5:25. Rome-Italy. [Accessed 30 September 2017]

Mashinini, G. (2016). Announcement of results for 2016 Municipal Elections: Chairperson Glen Mashinini. http://www.elections.org.za/content/About-Us/News/Chairperson-Glen-Mashinini-announces-results-for-2016-Municipal-Elections/ [Accessed 20 January 2018]

Mbambezeli, G & Notten, A. (2008). Celtis africana Burm.f. Kirstenbosch National Botanical Garden. http://pza.sanbi.org/celtis-africana

Mbambezeli, G. (2008). *Searsia pyroides (Burch.) Moffett*. SANBI: Plant Africa. Kirstenbosch National Botanical Garden. http://pza.sanbi.org/searsia-pyroides [Accessed 20 January 2018]

McNabb, D. E. (2013). *Research methods in public administration and non-profit management: quantitative and qualitative approaches.* Armonk, NY: M.E. Sharpe. http://oasis.unisa.ac.za/search~S1?/tResearch+methods+in+public+administration+and+non-profit+management%3A+quanti/tresearch+methods+in+public+administration+and+non+profit+management+quanti/-

3%2C0%2C0%2CB/frameset&FF=tresearch+methods+in+public+administration+and+nonprofit+management+quantitative+and+qualitative+approaches&3%2C%2C3/indexsort [Accessed 17 January 2017].

McNally, C. G., A. J. Gold, R. B. Pollnac, and H. Kiwango. (2016). Stakeholder perceptions of ecosystem services of the Wami River and Estuary. *Ecology and Society* 21(3):34. http://dx.doi.org/10.5751/ES-08611-210334

Middleton, J. Goldblatt, M., Jakoet, J. & Palmer, I. (2011). *Environmental Management and Local Government: Palmer Development Group Occasional Paper No. 1*. Palmer Development Group. http://pdg.co.za/wp-content/uploads/2012/04/Environmental-management-and-local-government.pdf [Accessed 16 April 2016].

Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-Being: Wetlands and Water Synthesis*. World Resources Institute, Washington, DC http://www.millenniumassessment.org/documents/document.358.aspx.pdf [Accessed 24 July 2016].

Msimanga, S. (2017). SoCA 2017: The progress we have made thus far is only just the beginning. http://www.tshwane.gov.za/sites/about_tshwane/CityManagement/State%20of%20The%20City%20Addresses/State%20of%20the%20Capital%20Address%202017.PDF [Accessed 20 January 2018]

Mutekwa, V.T & Gambiza, J. (2017). Forest protected areas governance in Zimbabwe: Shift needed away from a long history of local community exclusion. *Journal of Environmental Management*. 198: 330-339.

Mouton, J. (2013). *How to Succeed in Your Master's and Doctoral Studies. A South African Guide and Resource Book*. Van Schaik, Pretoria.

Niedziałkowski, K., Paavola, J & Jędrzejewska, B. (2012). Participation and protected areas governance: the impact of changing influence of local authorities on the conservation of the Bialowieza Primeval Forest, Poland, *Ecology and Society*, Vol 2, 1-17. [Accessed 21 December 2017]

Nishishiba, M., Jones, M & Kraner, M. (2013). *Title Research methods and statistics for public and non-profit administrators: a practical guide.* Los Angeles: SAGE. [Accessed 17 January 2017].

Novoa, A., Shackleton, R., Canavan, S., Cybele, C., Davies, S.J., Dehnen-Schmutz, K. , Fried, J,Gaertner, M., Geerts, S., Griffiths, C.L., Kaplan, H., Kumschick, H., Le Maitre, D.C., Measey, G. H., Nunes, A.L., Richardson, D.M, Robinson, T.M ,Touza, J. & J.R. U.Wilson. (2018). A framework for engaging stakeholders on the management of alien species. *Journal of Environmental Management.* 205. 286 – 297. https://www.sciencedirect.com/science/article/pii/S0301479717309283

[Accessed 21 July 2018]

Ollis, D.J., Snaddon, C.D., Job, N.M. & Mbona, N. (2013). Classification System for wetlands and other aquatic ecosystems in South Africa. User Manual: Inland Systems. *SANBI Biodiversity Series 22.* South African National Biodiversity Institute, Pretoria. https://www.sanbi.org/sites/default/files/documents/documents/sanbi-biodiversity-series-wetlands-classification-no-22.pdf [20 January 2018]

Ommen, N.O., Blut, M., Backhaus, C. & Woisetschläger, D.M. (2016). Toward a better understanding of stakeholder participation in the service innovation process: More than one path to success. *Journal of Business Research*. 69: 2409–2416.

O'Sullivan, E., Rassel, G.R., & Berner, M. (2008). *Research methods for public administrators*. New York: Pearson Longman [Accessed 12 January 2016].

Pascal, C.B. (2006). Managing Data for Integrity: Policies and Procedures for Ensuring the Accuracy and Quality of the Data in the Laboratory. *Science and Engineering Ethics*.12, 23-39 http://www.thphys.uni-heidelberg.de/~stamatescu/DIDEPG/SEMPE/SEE/see1_20001047.pdf [Accessed 12 January 2016].

Pittock, J., Finlayson, M., Arthington, A. H., Roux, D., Matthews, J. H., Biggs, H., Harrison, I., Blom, E., Flitcroft, R., Froend, R., Hermoso, V., Junk, W., Kumar, R., Linke, S., Nel, J., Nunes da Cunha, C., Pattnaik, A., Pollard, S., Rast, W., Thieme, M., Turak, E., Turpie, J., van Niekerk, L., Willems, D. and Viers, J. (2015). Managing freshwater, river, wetland and estuarine protected areas. in G. L. Worboys, M. Lockwood, A. Kothari, S. Feary and I. Pulsford (eds) *Protected Area Governance and*

Management, pp. 569–608, ANU Press, Canberra. https://www.csu.edu.au/__data/assets/pdf_file/0007/1297033/Pittock-et-al-2015.-Managing-freshwater,-estuarine-protected-areas-1.pdf [Accessed 21 December 2017]

Pretoria News Property. (2012). Environmental protest grows over proposed Colbyn development. http://www.iolproperty.co.za/roller/news/entry/environment_protest_grows_over_proposed [Accessed 29 October 2017]

Pretoria News.(2013) *Colbyn Park-and-ride on the agenda*. 17 January 2013. https://www.iol.co.za/pretoria-news/colbyn-park-and-ride-on-the-agenda-1453687 [Accessed on 24 September 2015].

Priest. S. (2012). *Peatlands*. Fact Sheet. Educational resource for Orono Bog Boardwalk. https://umaine.edu/oronobogwalk/files/2013/03/What-is-a-Peatland.pdf [Accessed 24 July 2016].

Ramsar Convention Secretariat. (2013). *The Ramsar Convention Manual: a guide to the Convention on Wetlands (Ramsar, Iran, 1971)*, 6th edition. Ramsar Convention Secretariat, Gland, Switzerland. http://www.ramsar.org/sites/default/files/documents/library/manual6-2013-e.pdf.

Ramsar Convention Secretariat (2010). *Managing wetlands: Frameworks for managing Wetlands of International Importance and other wetland sites*. Ramsar handbooks for the wise-use of wetlands, 4th edition, vol. 18. Ramsar Convention Secretariat, Gland, Switzerland. http://www.ramsar.org/sites/default/files/documents/pdf/lib/hbk4-18.pdf [Accessed 21 May 2017]

Ramsar Convention Secretariat. (2007). *Wise-use of wetlands: A Conceptual Framework for the wise-use of wetlands.* Ramsar handbooks for the wise-use of wetlands, 3rd edition, vol. 1. Ramsar Convention Secretariat, Gland, Switzerland. http://www.gwp.org/globalassets/global/toolbox/references/wise-use-of-wetlands-ramsar-2007.pdf [Accessed 21 May 2017]

Ramsar Convention Secretariat. (2010a). *Managing wetlands: Frameworks for managing Wetlands of International Importance and other wetland sites*. Ramsar handbooks for the wise-use of wetlands, 4th edition, vol. 18. Ramsar Convention Secretariat, Gland,

Switzerland. http://www.ramsar.org/sites/default/files/documents/pdf/lib/hbk4-18.pdf. [Accessed 28 October 2017]

Ramsar Convention Secretariat. (2010b). *Wetland CEPA: The Convention's Programme on communication, education, participation and awareness (CEPA) 2009-2015.* Ramsar handbooks the wise-use of wetlands, 4th edition, Volume 6. Ramsar Convention Secretariat, Gland, Switzerland. http://www.ramsar.org/sites/default/files/documents/library/hbk4-06.pdf. [Accessed 28 October 2017]

Ramsar Convention Secretariat. (2012). *Enhancing the wise-use of wetlands: a framework for capacity Development.* Ramsar COP11 DOC. 34. Ramsar Convention Secretariat, Gland, Switzerland. http://wetlands.un-ihe.org/sites/wetlands.un-ihe.org/files/cop11-doc34-e-capacity.pdf [Accessed 21 May 2017]

Ramsar Convention Secretariat. (2015). *State of the World's Wetlands and their Services to People: A compilation of recent analyses.* Ramsar Briefing Note 7. Ramsar Convention Secretariat, Gland, Switzerland. http://www.ramsar.org/sites/default/files/documents/library/cop12_doc23_bn7_sowwss_e_0.pdf [Accessed 21 May 2017]

Ramsar Convention Secretariat. (2015). Communications / CEPA Action Plan for the Ramsar Secretariat 2016-2021 Consultation Draft. http://www.ramsar.org/sites/default/files/documents/library/cop12_doc26_comms_cepa_action_plan_e_0.pdf. [Accessed 28 October 2017]

Ramsar Convention Secretariat. (2016). *An Introduction to the Convention on Wetlands (previously The Ramsar Convention Manual).* Ramsar Convention Secretariat, Gland, Switzerland. https://www.ramsar.org/sites/default/files/documents/library/handbook1_5ed_introductiontoconvention_e.pdf [Accessed 29 December 2017]

RAC/SPA and IUCN-Med (2013). *Stakeholder Participation Toolkit for Identification, Designation and Management of Marine Protected Areas.* RAC/SPA and IUCN-Med. Ed. RAC/SPA, Tunis. http://www.rac-spa.org/sites/default/files/mpa_stakeholder_toolkit.pdf [Accessed 23 May 2016].

Rebelo, L.M., Finlayson, C.M., Nagabhatla, N. (2009). Remote sensing and GIS for wetland inventory, mapping and change analysis. *Journal of Environmental Management*. Vol. 90(7):2144-53. https://www.ncbi.nlm.nih.gov/pubmed/18367311 [Accessed 21 December 2017]

Reitzes, M. (2009). *The Impact of Democracy on Development: the case of South Africa.* Centre for Policy Studies, Johannesburg. Research Report 120. http://www.cps.org.za/cps%20pdf/RR1.pdf [Accessed 23 July 2016].

Roe D., Nelson, F., Sandbrook, C. (eds.). (2009). *Community management of natural resources in Africa: Impacts, experiences and future directions*. Chapter 3-4. Natural Resource Issues No. 18, International Institute for Environment and Development, London, UK. http://pubs.iied.org/pdfs/17503IIED.pdf [Accessed 9 October 2016].

Reed, M.S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C.H & Stringer, LC. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, 90, 1933–1949. [21 May 2016]

SANBI. (2013). *Grasslands Ecosystem Guidelines: landscape interpretation for planners and managers*. Compiled by Cadman, M., de Villiers, C., Lechmere-Oertel, R. and D. McCulloch. South African National Biodiversity Institute, Pretoria. http://biodiversityadvisor.sanbi.org/wp-content/uploads/2015/06/2013_Grassland-Ecosystem-Guidelines.pdf [Accessed 21 May 2017]

SANBI. (2014). *A Framework for investing in ecological infrastructure in South Africa*. South African National Biodiversity Institute, Pretoria. http://www.sanbi.org/sites/default/files/documents/documents/framework-ieimarch2014sanbi.pdf [Accessed 16 April 2016].

SANBI. (2017). *Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning.* Compiled by Driver, A., Holness, S. & Daniels, F. South African National Biodiversity Institute, Pretoria. [Accessed 24 October 2017]

Springer, J. & Almeida, F. (2015). *Protected Areas and the Land Rights of Indigenous Peoples and Local Communities: current Issues and Future Agenda*. Rights and Resources initiative. http://www.rightsandresources.org/wp-

content/uploads/RRIReport_Protected-Areas-and-Land-Rights_web.pdf [Accessed 20 August 2016]

Secretariat of the Convention on Biological Diversity. (2004) Programme of Work on Protected Areas (CBD Programmes of Work) Montreal: Secretariat of the Convention on Biological Diversity 31 p. https://www.cbd.int/doc/publications/pa-text-en.pdf [Accessed 15 March 2016]

Secretariat of the Convention on Biological Diversity, Netherlands Commission for Environmental Assessment. (2006). Biodiversity in Impact Assessment, Background Document to CBD Decision VIII/28: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment, Montreal, Canada. https://www.cbd.int/doc/publications/cbd-ts-26-en.pdf [Accessed 22 July 2018]

Secretariat of the Convention on Biological Diversity. (2012a). *National Action for Protected Areas*. http://www.georgewright.org/cbd [Accessed 15 March 2016].

Secretariat of the Convention on Biological Diversity (2012b) NBSAP training modules, Version 2 – Module B-5. Ensuring Inclusive Societal Engagement in the Development, Implementation and Updating of NBSAPs. Montreal, July 2012 (revised). https://www.cbd.int/doc/training/nbsap/b5-train-stakeholder-nbsap-revised-en.pdf [Accessed on 22 July 2018]

Secretariat of the Convention on Biological Diversity. (2014). *Global Biodiversity Outlook 4 — Summary and Conclusions*. Montréal, 20 pages. https://www.cbd.int/gbo/gbo4/gbo4-summary-en.pdf. [Accessed 23 July 2016].

Shackleton, M.C. (2009). Will the real custodian of natural resource management please stands up? *South African Journal of Science*. 105. Commentary. March/April 2009. http://www.sajs.co.za/sites/default/files/publications/pdf/51-192-1-PB.pdf. [Accessed 23 September 2017]

Sherwill, T. (2015). *Colbyn Valley – The ultimate urban wetland survivor*. The Water Wheel Magazine. January/February 2015 edition. Water Research Commission, Pretoria. http://www.wrc.org.za/Pages/Preview.aspx?ItemID=11086&FromURL=%2fPages%2fDisplayItem.aspx%3fItemID%3d11086%26FromURL%3d%252fPages%252fDefault.aspx%253fdt%253d%2526ms%253d%2526d%253dColbyn%2bValley%2b-

%2bThe%2bultimate%2burban%2bwetland%2bsurvivor%2526start%253d1 [Accessed 24 August 2018]

Shivakoti, Y. & Shivakoti, G.P. (2008). *Decentralization and co-management of protected areas in Indonesia*. http://commission-on-legal-pluralism.com/volumes/57/yonarizashivakoti-art.pdf. [Accessed 28 May 2016].

Sieben, E.J.J., Mtshali, H., & Janks, M. (2014). *National Wetland Vegetation Database: Classification and Analysis of Wetland Vegetation Types for Conservation Planning and Monitoring*. Water Research Commission. WRC Report No. 1980/1/14. http://www.wrc.org.za/Knowledge%20Hub%20Documents/Research%20Reports/1980-1-14.pdf [Accessed 13 May 2017]

Snyman, H.A., Ingram, L.J & K P Kirkman. (2013). Themeda triandra: a keystone grass Species. *African Journal of Range & Forage Science*.30:3: 99-125 http://www.tandfonline.com/doi/abs/10.2989/10220119.2013.831375?journalCode=tarf20 [Accessed 24 October 2017]

Snyman, S. (2014). Assessment of the main factors impacting community members' attitudes towards tourism and protected areas in six southern African countries, *Koedoe*, 56 (2), 12 pages. http://www.koedoe.co.za/index.php/koedoe/article/view/1139/1638 [Accessed 28 May 2016].

South African Cities Network. (2014). City of Tshwane Vulnerability Assessment to Climate Change. SACN Programme: Climate Change. http://resilientcities2015.iclei.org/fileadmin/RC2015/files/City_of_Tshwane_Vulnerability_and_Adaptation_Plan_draft.pdf [Accessed 24 October 2017]

South African National Biodiversity Institute: BGIS. (2016). *Biodiversity GIS (BGIS) - Informing Biodiversity Action*. http://www.sanbi.org/biodiversity-science/science-policyaction/biodiversity-information-management/biodiversitygis-bgis-i [Accessed May 2016].

Statistics South Africa. (2016). *The state of basic service delivery in South Africa: In-depth analysis of the Community Questionnaire 2016 data*, Pretoria: Statistics South Africa. 120 pp. http://www.statssa.gov.za/publications/Report%2003-01-22/Report%2003-01-222016.pdf [Accessed 10 September 2017]

Sterling, E.J., Betley, E., Sigouin, A., Gomez, A., Toomey, A., Cullman, G., Malone,C., Pekor.A., Arengo,F., Blair.M., Filardi,C., Landrigan, K. & Porzecanski, A.L. (2017). Assessing the evidence for stakeholder engagement in biodiversity conservation. Biological Conservation. Volume 209, 159-171. https://www.sciencedirect.com/science/article/pii/S0006320717302069?via%3Dihub

[Accessed 21 July 2018]

Strack, M. (2008). *Peatlands and Climate Change*. International Peat Society. Vapaudenkatu Jyväskylä, Finland, http://www.peatsociety.org/sites/default/files/files/PeatlandsandClimateChangeBookIPS2008.pdf [Accessed 15 May 2016].

Swemmer, L., Mmethi, H., Twine, W. (2017). Tracing the cost/benefit pathway of protected areas: A case study of the Kruger National Park, South Africa. *Journal of Ecosystem Services.* Volume 28, Part B. 162-172. https://doi.org/10.1016/j.ecoser.2017.09.002 [Accessed 29 December 2017]

Taylor, S.J. & Atkinson, D., 2012, 'Delivering community benefits acts as insurance for the survival of small protected areas such as the Abe Bailey Nature Reserve, South Africa', Koedoe 54(1), Art. #1043, 9 pages. http://dx.doi.org/10.4102/koedoe.v54i1.1043

[Accessed 29 December 2017]

The DAFF News. (2013). *Cleaning up the Colbyn wetland for Mandela Day (P. 6).* August 2013. The DAFF news is Official newsletter of the Department of Agriculture, Forestry and Fisheries (DAFF). http://www.daff.gov.za/docs/agrinews/august13.pdf [Accessed 11 January 2018]

The Water and Sanitation Program. (2011). Water Supply and Sanitation in South Africa Turning Finance into Services for 2015 and Beyond. African Ministers' Council on Water (AMCOW) Country Status Overview: South Africa. The Water and Sanitation Program (WSP) is a branch of the of World Bank Group's Water Global Practice supported by various partner-organisation for sustainable access, provision and affordable to water and sanitation. http://wsp.org/sites/wsp.org/files/publications/CSO-SouthAfrica.pdf [Accessed on 10 February 2018]

Tripathy, J.P. (2013). Secondary Data Analysis: Ethical Issues and Challenges. *Iranian Journal of Public Health.* 42(12),1478–1479. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4441947/ [Accessed 23 July 2016].

UNEP and UN-HABITAT. (2005). *Ecosystems and Wetland: The Role of Cities involvement influence implementation.* http://staging.unep.org/urban_environment/PDFs/Ecosystems_and_Wetland_Role_of_Cities.pdf [Accessed 25 September 2017]

United Nations. (1992). *Conference of Parties: Convention on Biological diversity.* https://www.cbd.int/doc/legal/cbd-en.pdf [Accessed 23 July 2016].

United Nations. (2009). *State of the world's indigenous peoples*. Chapter 2-3. United Nations publication. Sales No. 09.VI.13 http://www.un.org/esa/socdev/unpfii/documents/SOWIP/en/SOWIP_web.pdf [Accessed 21 May 2017]

University of Pretoria. (2014). *Transvaal Supergroup*: *Geological Processes and Materials*. Student Learning Material for Course SGM210 published on 9 April 2014. http://www.varsityfield.com/uploads/1/3/0/5/13050122/4._transvaal_supergroup.pdf [Accessed 24 October 2017]

Umhlaba Consulting Group. (2013). Land Acquisition and Transfer. Land and Settlement Development Research Study. Afesis-Corplan. http://afesis.org.za/wp-content/uploads/2017/05/Land_acquisition_final.pdf [Accessed 21 January 2018]

Van Staden. S., de Klerk, M., & Mileson, A. (2013). *Faunal, floral, wetland and aquatic assessment as part of the environmental assessment and authorisation process for the proposed Tharisa mine development project, North West Province* prepared for SLR Consulting (Africa) (Pty) Ltd. 2013. http://www.sahra.org.za/sahris/sites/default/files/additionaldocs/App%20E5%20Biodiversity%20%20Section%20E%20Aquatic.pdf [Accessed 24 October 2017]

Van Vuuren, L. (2010). For peat sakes – can SA afford the demise of its natural carbon & water stores for the sake of short-term economic gain? *The Water Wheel*, July/August. http://www.wrc.org.za/Knowledge%20Hub%20Documents/Water%20Wheel/Articles/2010/2010%20Jul-Aug%20peatland.pdf [Accessed 9 October 2016]

Wetlands International. (2014). *What are wetlands*? https://www.wetlands.org/the-problem/what-are-wetlands/ [Accessed 24 July 2016]

Willoughby, N., Grimble, R., Ellenbroek, W., Danso, E., Amatekpor, J. (2001). The wise-use of wetlands: identifying development options for Ghana's coastal Ramsar sites. *Hydrobiologia.* 458: 1–3, 221–234. https://link.springer.com/article/10.1023/A:1013158329107 [Accessed 28 October 2017]

World Wide Fund for Nature. (2000). *Stakeholder Collaboration Building Bridges for Conservation. Ecoregional Conservation Strategies Unit Research and Development*. Washington, D.C. http://awsassets.panda.org/downloads/collaboration.pdf [Accessed 28 May 2016]

Wright, L. (2005). Sustainable Transport: A sourcebook for Policy-makers in developing cities Module 3a: Car-Free Development. http://www.sutp.org/files/contents/documents/resources/A_Sourcebook/SB3_Transit-Walking-and-Cycling/GIZ_SUTP_SB3e_Car-free-Development_EN.pdf [Accessed 29 October 2017]

Young, J. C., Jordan, A., Searle, KR., Butler, A., Chapman, D.S., Simmons, P., Watt, A.D. (2013). Does stakeholder involvement really benefit biodiversity conservation? *Journal of Biological Conservation*, 58, 359–370. [Accessed 28 May 2016]

Zainal, Z. (2007). Case study as a research method. *Jurnal Kemanusiaan*, 9. Jun 2007. http://psyking.net/htmlobj-3837/case_study_as_a_research_method.pdf [Accessed 26 June 2016].

Zucker, D.M. (2009). *How to Do Case Study Research.* University of Massachusetts – Amherst: School of Nursing Faculty Publication Series. Paper 2. http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1001&context=nursing_faculty_pubs [Accessed 26 June 2016].

APPENDICES

Appendix 1: Questionnaire - local residents

Title of the study

Multi-stakeholder Management of a Wetland in the City of Tshwane: The case of Colbyn.

Researcher

My name is Kennedy Nemutamvuni. I am a Master of Science student in Environmental Management at the University of South Africa under the supervision of Dr T. M. McKay.

Introduction

This study seeks to examine the relationship between the community and the Colbyn Wetland Nature Reserve.

Invitation to participate

This is an invitation to you to participate in the study.

What is involved in the study?

Your involvement in the study would be that of being a participant in a questionnaire. The process will not be a long one and should take a maximum time of 20 minutes.

Risks

While nothing in life is risk free, there are, for all intents and purposes, no risks involved in participation.

Participation is voluntary

The refusal to participate will have no penalty or loss of benefits to which the participant is otherwise entitled, and that the participant may discontinue participation at any time without penalty loss of benefits to which they are otherwise entitled.

Confidentiality

All personal information will be kept confidential and there will be no personal ramifications of any results found. Results will be captured in a manner that will ensure confidentiality.

Contact details of researcher

For further information you can contact me on 0790787367 or muvhusokennedy@yahoo.com or the supervisor Dr T. M. McKay on 073 264 9496 or mckaytjm@unisa.ac.za

Consent Document

Multi-stakeholder Management of a Wetland in the City of Tshwane: The case of Colbyn

I confirm that:

- I have been informed about the above study.
- I have also received, read and understood the study as explained in the participant information form.
- I understand that my all personal details (identifying data) will be kept strictly confidential.
- I understand that I may, at any stage, withdraw consent and participation in the study.
- I have had sufficient opportunity to ask questions and am prepared to participate in the study
- I understand the research protocol above.

Participant Signature:..... Date: .....

Witness Signature: ..... Date: .....

1.1 Are you a resident of Colbyn or any suburb around Colbyn Wetland Nature Reserve?

1.Yes		2. NO	

1.2 If so, when did you start living here?

1. A year or so ago		2. Between 1 and 5 years ago		3. More than 5 years ago	

1.3 When did you first hear about the Friends of Colbyn Valley?

1. A year or so ago		2. Between 1 and 5 years ago		4. Never heard of them	

1.4 Are you a member of Friends of Colbyn Valley? i.e membership refers to the support/participation in the affairs of the group. This can be regularly or sometimes. It is further regardless of whether the person has affiliated or not.

1.Yes		2. NO	

1.5 What is your status of membership?

1. Affiliate i.e joined as a member (paying)	
2.Non-affiliate i.e. joined as an associate (non-paying)	
3. Only subscribe to the mailing list	
4. Not sure	

1.6 Were you part of the former "Friends of Colbyn" that was replaced by the current "Friends of Colbyn Valley"?

1.Yes		2. NO		3. Never heard of the group	

1.7 Are you aware of the Colbyn Wetland Nature Reserve (know of it)?

1.Yes		2. NO	

1.8 What aspects of this nature reserve appeal to you?

.....

.....

.....

.....

.....

1.9 Does the nature reserve have any impact on your life?

……

……

……..

2.1 Is there any support you give to the nature reserve? E.g volunteers work, financial support, material support etc

01 Actively involved	
02 Involved now	
03 Seldom involved	
04 Never involved	
05 Need more information to be involved (please specify)	

2.2 If so, what type of support (please specify) do you offer?

……

……

……

……

……

2.3 Why did you choose to offer such a support?

……

……

……

……

……

2.4 Do you involve any of your family members in the support you give to the nature reserve?

1.Yes		2. NO		3. Sometimes	

3.1 How often do you visit the nature reserve?

1	Daily	
2	Once in a week	
3	Once a month	
4	weekends	
5	Almost never, once a year maybe…	

3.2 Are there any problems you think are threatening the sustainability of the nature reserve?

……....

……

……

……

3.3 What else do you think needs to be done in this nature reserve?

……..

……..

3.4 Did the declaration of the nature reserve affect you in any way?

1.Yes		2. NO	

3.5 If yes, would you explain?

……
….

3.6 Are you in anyway involved in the management of the nature reserve?

1.Yes		2. NO	

3.7 If yes, would you explain?

……
…..

4.1 Gender

1. Male		2. Female	

4.2 Home Language

1	English		4	Afrikaans	
2	Setswana		5	Other (specify)	

4.3 What racial group do you identify yourself as?

1	Asian (e.g. Chinese, Korean)		4	Indian	
2	African		5	White	
3	Coloured		6	Other	

4.4 Educational Level

1	Primary School	
2	Completed Grade 9	

3	Completed Grade 12	
4	Tertiary Undergraduate Degree/Diploma	
5	Honour's Degree	
6	Master's and/or PhD Degree	

4.4 Employment status

1.	Political	e.g Councillor, party leader, chief whips etc	
2	Professional	e.g. engineers, healthcare workers, accountants, lawyers, architects etc	
3	Managerial or technical	e.g. Director generals, executive directors, general managers, deputy directors etc	
4	Non- manual, skilled	e.g. clerks, cashiers, sales personnel, secretaries etc	
5	Manual, skilled	e.g. skilled construction workers, electricians, plumbers, craftsmen, technicians etc	
6	Partly skilled	e.g. domestic workers, machine setters/ operators, protective services, waiters	
7	Unskilled	e.g. construction workers, miners, manufacturing workers, labourers	
8	Does not work	e.g. pensioner, student, stay at home parent	

Appendix 2: Questionnaire - Secondary and Tertiary stakeholders

Title of the study

Multi-stakeholder Management of a Wetland in the City of Tshwane: The case of Colbyn.

Researcher

My name is Kennedy Nemutamvuni. I am a Master of Science student in Environmental Management at the University of South Africa under the supervision of Dr T. M. McKay.

Introduction

This study seeks to examine the relationship between the community and the Colbyn Wetland Nature Reserve.

Invitation to participate

This is an invitation to you to participate in the study.

What is involved in the study?

Your involvement in the study would be that of being a participant in a questionnaire. The process will not be a long one and should take a maximum time of 20 minutes.

Risks

While nothing in life is risk free, there are, for all intents and purposes, no risks involved in participation.

Participation is voluntary

The refusal to participate will have no penalty or loss of benefits to which the participant is otherwise entitled, and that the participant may discontinue participation at any time without penalty loss of benefits to which they are otherwise entitled.

Confidentiality

All personal information will be kept confidential and there will be no personal ramifications of any results found. Results will be captured in a manner that will ensure confidentiality.

Contact details of researcher

For further information you can contact me on 0790787367 or muvhusokennedy@yahoo.com or the supervisor Dr T. M. McKay on 073 264 9496 or mckaytjm@unisa.ac.za

Consent Document

Multi-stakeholder Management of a Wetland in the City of Tshwane: The case of Colbyn

I confirm that:

- I have been informed about the above study.
- I have also received, read and understood the study as explained in the participant information form.
- I understand that my all personal details (identifying data) will be kept strictly confidential.
- I understand that I may, at any stage, withdraw consent and participation in the study.
- I have had sufficient opportunity to ask questions and am prepared to participate in the study
- I understand the research protocol above.

Participant Signature:..... Date: .....

Witness Signature: ..... Date: .....

1.1 Are you a stakeholder/participant of Colbyn Wetland Nature Reserve?

1.Yes		2. NO	

1.2 If so, when did you become a stakeholder?

1. A year or so ago		2. Between 1 and 5 years ago		3. More than 5 years ago	

1.3 When did you first hear about the Colbyn Wetlands Nature Reserve?

1. A year or so ago		2. Between 1 and 5 years ago		4. Never heard of them	

1.4 What is your role in the Nature Reserve?

1. Authority e.g gov dept or municipality	
2.Non-government or research or related institution	

1.5 What aspects of this nature reserve appeal to you as an institution?

.....

.....

.....

.....

.....

1.6 Does the nature reserve have any impact on your institution/department? Please explain

.....

.....

.....

1.7 Is there any support you give to the nature reserve? E.g volunteers work, financial support, material support etc

01 Actively involved	
02 Involved now	
03 Seldom involved	
04 Never involved	
05 Need more information to be involved (please specify)	

1.8 If so, what type of support (please specify) do you offer?

.....

.....

.....

.....

.....

1.9 Why did you choose to offer such a support?

.....

.....

.....

.....

.....

10 How often do you visit the nature reserve?

1	Daily	
2	Once in a week	
3	Once a month	
4	weekends	
5	Almost never, once a year maybe…	

11. Are there any problems you think are threatening the sustainability of the nature reserve?

.....

.....

.....

.....

.....

12. What else do you think needs to be done in this nature reserve?

.....

.....

13. Did the declaration of the nature reserve affect you in any way?

1.Yes		2. NO	

14. If yes, would you explain?

.....

15. Are you in anyway involved in the management of the nature reserve?

1.Yes		2. NO	

16. If yes, would you explain?

.....

Appendix 3: Research Ethics Clearance: 2016/CAES/108

UNISA university of south africa

CAES RESEARCH ETHICS REVIEW COMMITTEE

National Health Research Ethics Council Registration no: REC-170616-051

Date: 04/11/2016

Ref #: **2016/CAES/108**
Name of applicant: **Mr K Nemutamvuni**
Student #: **49966863**

Dear Mr Nemutamvuni,

Decision: Ethics Approval

Proposal: Multi-stakeholder management of a wetland in the city of Tshwane: The case of Colbyn

Supervisor: Mrs T McKay

Qualification: Postgraduate degree

Thank you for the application for research ethics clearance by the CAES Research Ethics Review Committee for the above mentioned research. Approval is granted for the project, *subject to submission of the relevant permission letters and the consent form.*

Please note that the approval is valid for a one year period only. After one year the researcher is required to submit a progress report, upon which the ethics clearance may be renewed for another year.

Due date for progress report: 30 November 2017

Please note points 4 and 5 below for further action.

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the CAES Research Ethics Review Committee on 03 November 2016.

The proposed research may now commence with the proviso that:

1) The researcher/s will ensure that the research project adheres to the values and

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principles expressed in the UNISA Policy on Research Ethics.

2) *Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the CAES Research Ethics Review Committee. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.*
3) *The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.*
4) *Unisa has a standard consent form that must be used to obtain consent from participants. It is provided on the college website:* http://www.unisa.ac.za/Default.asp?Cmd=ViewContent&ContentID=27669
   The researcher may not use any other consent form, and is requested to submit the draft consent form to the Committee for record purposes.
5) *Permission from the community leaders, relevant local authorities and the nature reserve should be obtained and submitted before data gathering may commence.*

Note:
The reference number [top right corner of this communiqué] should be clearly indicated on all forms of communication [e.g. Webmail, E-mail messages, letters] with the intended research participants, as well as with the CAES RERC.

Kind regards,

Signature
CAES RERC Chair: Prof EL Kempen

Signature
CAES Executive Dean: Prof MJ Linington
NB! CONDITIONS