

FRANCES BAARD DISTRICT MUNICIPALITY WETLAND REPORT | 2017

LOCAL ACTION FOR BIODIVERSITY (LAB): WETLANDS SOUTH AFRICA



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SANBI 
Biodiversity for Life
South African National Biodiversity Institute



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in a Changing Climate

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FOREWORD



Wetlands are important features in the landscape that provide numerous beneficial services for people and nature. Some of the valuable functions include protecting and improving water quality, providing natural habitats, storing floodwaters, maintaining surface water during dry periods and aesthetic open space.

Most of the wetlands of the Frances Baard District may usually appear dry, dependant on seasonal rainwater when they briefly flourish full of life. Other wetlands remain wet for longer, particularly those receiving treated sewerage such as Ganspan in Jan Kempdorp and the world-famous Kamfersdam north of Kimberley. These wetlands provide reliable refuges for waterbirds in a semi-arid area. Kamfersdam is an important tourist attraction and is particularly significant as it is one of the very few breeding sites for the Lesser Flamingo.

Our wetlands are under enormous pressure. The most significant threats to some of the wetlands are poor water quality, due to unacceptably high levels of nitrates, phosphates and heavy metals from poorly treated sewage effluent. The expansion of urban development towards wetlands have become recent threats despite conservancy areas mapped as green zones in the local municipalities' spatial development frameworks. The lack of a proper management plan is a matter of great concern, but we are determined to overcome political apathy concerning wetlands.

I want to humbly appeal to tourists and local residents to make it their responsibility to ensure that they treat these areas with respect by not littering or exploiting the natural resources that have earned these areas such acclaim.

The Frances Baard District Municipality, in partnership with various stakeholders, is committed to the maintenance and protection of our wetlands as functioning ecosystems. It is our wish that the implementation of this report will create further awareness amongst our communities and local authorities. Wetlands are not only crucial for the local tourism industry, but the conservation of these natural assets is also crucial to ensure that they are preserved for the health and recreational benefit of communities.

I would like to take this opportunity to express my sincere gratitude to ICLEI Africa for their philanthropic consideration that led to the implementation of the LAB Wetlands South Africa Project in Frances Baard District Municipality.

It is with great pleasure that I present you with the Wetland Report for the Frances Baard District Municipality. I am conscious of the fact that when we work for the environment it will continue to work for us.

Let's make it happen.

CLLR B.V. XIMBA
Executive Mayor
Frances Baard District
Municipality



ICLEI – LOCAL GOVERNMENTS FOR SUSTAINABILITY

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ICLEI – Local Governments for Sustainability is the leading global network of over 1,500 cities, towns and regions committed to building a sustainable future. By helping the ICLEI Network to become sustainable, low-carbon, ecomobile, resilient, biodiverse, resource-efficient, healthy and happy, with a green economy and smart infrastructure, we impact over 25% of the global urban population.

ICLEI Africa’s work is conducted by a dynamic and passionate team of professionals that seek to work with cities to ensure a more sustainable future, with a specific focus on urban biodiversity matters.

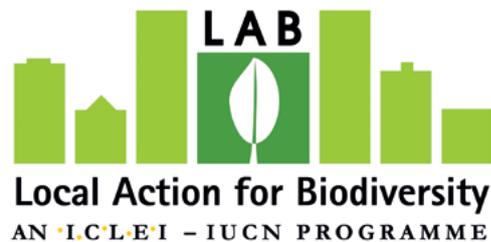
In order to strengthen the role cities and local governments play in the pursuit of greater sustainability through the collaborative design and implementation of integrated urban development and effective biodiversity management, the ICLEI Cities Biodiversity Center (ICLEI CBC) was created in 2009. The ICLEI CBC is located in Cape Town, South Africa, embedded in the Africa Regional Office of ICLEI. We offer cities a broad portfolio of supportive services through our dedicated team of passionate, skilled and dynamic biodiversity and urban development experts.



ICLEI CITIES BIODIVERSITY CENTER

LOCAL ACTION FOR BIODIVERSITY PROGRAMME

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The ICLEI Cities Biodiversity Center aims to create BiodiverCities, which promote urban biodiversity for the many benefits they offer, including human well-being, poverty alleviation, habitat conservation, air and water quality, climate change adaptation and mitigation, food provision, fortified infrastructure resilience, and happiness of citizens.

BiodiverCities are aware that ecosystem services contribute towards many essential municipal services, as well as towards the local economy, sustainability and social well-being of their cities. Biodiversity in cities provides a critical contribution towards achieving the global biodiversity targets. It

buffers further biodiversity loss, improves the urban standard of living, and provides local opportunities for global education and awareness.

ICLEI's Local Action for Biodiversity (LAB) programme is a unique global biodiversity programme run by The ICLEI Cities Biodiversity Center. The LAB Program is aimed at improving and enhancing ecosystem management at the local level, and is recognized globally as the leading results-driven local government biodiversity initiative. Currently, LAB is working on wetland restoration in South Africa under the Local Action for Biodiversity: Wetlands South Africa (LAB Wetlands SA) project.



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LIST OF ACRONYMS AND ABBREVIATIONS

AS	Africa Secretariat	NEM: WA	National Environmental Management: Waste Act
BGIS	Biodiversity Geographic Information System	NFEPA	National Freshwater Ecosystem Priority Areas
CBA	Critical Biodiversity Area	NWA	National Water Act
CEPA	Communication, Education and Public Awareness	SA	South Africa
CIP	Climate Information Portal	SAEON	South African Environmental Observation Network
CBAs	Critical Biodiversity Areas	SANBI	South African National Biodiversity Institute
CSAG	Climate Systems Analysis Group	SAWS	South African Weather Service
DEA	Department of Environmental Affairs	SDF	Spatial Development Framework
DDMC	District Disaster Management Centre	SOPs	Standard Operating Procedures
DENC	Department Environment and Nature Conservation	SPLUMA	Spatial Planning and Land Use Management Act
DMP	Disaster Management Plan	UNFCCC	United Nations Framework Convention on Climate Change
DWS	Department of Water and Sanitation	UCT	University of Cape Town
EIA	Environmental Impact Assessment	USEPA	United States Environmental Protection Agency
EMF	Environmental Management Framework	WFW	Working for Wetlands
ESAs	Ecological Support Areas	WWTW	Waste Water Treatment Works
FBDM	Frances Baard District Municipality		
FSWF	Free State Wetlands Forum		
GIS	Geographic Information System		
HWWTW	Homevale Waste Water Treatment Works		
IAP	Invasive Alien Plant		
IBA	Important Bird and Biodiversity Area		
ICLEI	ICLEI – Local Governments for Sustainability		
IDP	Integrated Development Plan		
LAB	Local Action for Biodiversity		
LM	Local Municipality		
MTSF	Medium Term Strategic Framework		
NC	Northern Cape		
NDP	National Development Plan		
NEMA	National Environmental Management Act		

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EXECUTIVE SUMMARY

Frances Baard District Municipality (FBDM) is located in the Northern Cape Province of South Africa and covers an area of 23 331 km², making it the smallest district in the Northern Cape. However, it accommodates the largest proportion of the population of the province estimated at 382 088.¹ The district comprises of four local municipalities namely Dikgatlong Local Municipality, Magareng Local Municipality, Phokwane Local Municipality and Sol Plaatjie Local Municipality. Kimberley, located in Sol Plaatjie Local Municipality, is the capital of the province, and also the home of the District Municipality head offices.

Key environmental features in the district include two of the largest rivers in South Africa, the Orange and the Vaal, which both flow through and meet in Frances Baard District Municipality. There is still a lot to learn about the wetland systems in the district; however various organisations and initiatives are emerging and beginning to study these systems throughout the Northern Cape. Wetland ecosystems in Frances Baard District Municipality are considered to be high-value 'ecological infrastructure' as they not only provide habitat for flora and fauna, but also have the potential to provide critical ecosystem services to the municipality. These include flood attenuation, water filtration, erosion control and water storage (regulatory services) as well as food provision, supply of raw materials and clean drinking water (provisioning services). The wetlands within the municipality also play a pivotal role in disaster risk management as well as reducing the impacts of the climatic change in the region.

Despite the value that wetlands provide, wetlands in the region are under enormous threat and have already been degraded or permanently lost. This is largely due to historical degradation, mining, deliberate draining of wetlands to make way for inappropriate development within the close proximity to wetlands, poorly regulated agricultural practices, contamination through chemical, sewage,

effluent and stormwater seeps, water abstraction and the spread of invasive alien plants (IAPs). Degraded wetlands are unable to function to the same degree as healthy wetlands and as such ecosystem service provision is severely hindered or even lost. There is a real need for proper management and investment in the maintenance of healthy wetlands and the rehabilitation and restoration of damaged or degraded wetlands is required. This will ensure the continued provision of these vital ecosystem services to the municipality.

Currently there is no specific designated wetland management authority within Frances Baard District Municipality. Instead, the management of wetlands is a collective, but disconnected effort between the various departments of the municipality, the four local municipalities within the district, provincial and national departments such as Department of Environment and Nature Conservation (DENC), Department of Water and Sanitation (DWS), Department of Environmental Affairs (DEA) – Working for Wetlands (WfW), South African Environmental Observation Network (SAEON) and the private sector (mines and private land owners).

In order to streamline and improve the management of wetlands, Frances Baard District Municipality is implementing the Local Action for Biodiversity: Wetlands South Africa (LAB: Wetlands SA) project with support from ICLEI Africa Secretariat (ICLEI AS). The LAB: Wetlands SA project aims to ensure the protection of priority natural wetland resources, thus enabling the supply of ecosystem services, and promoting resilient communities and sustainable local economies under a changing climate within South African local governments. Through the development of this Wetland Report, ICLEI AS will assist Frances Baard District Municipality in identifying the gaps in management and assist with devising new and better wetland management strategies for future.

INTRODUCTION

South Africa is endowed with a rich wealth of biodiversity, which offers an immense opportunity to support the country's development path by providing many goods and services which contribute to municipal service delivery, water and food security, and quality of life, especially under a changing climate. Wetlands in particular, are high-value 'ecological infrastructure', providing critical ecosystem services such as clean water, clean air, food, medicines, water storage and habitat for biodiversity. Wetlands also play a role in disaster management, and could lessen the negative effects of climate change through flood attenuation, temperature regulation and water and food security.

Wetlands however are South Africa's most threatened ecosystems, with 48% of wetland ecosystems critically endangered,² resulting in an urgent need to increase awareness of wetland importance and to incorporate natural wetland resource considerations into municipal governance mechanisms and planning.

Wetlands are exceptionally high value ecosystems that make up a small fraction of the country. Given their strategic importance for ensuring water quality and regulating water supplies, investment in conserving, managing and restoring wetlands are likely to generate disproportionately large returns.



FIGURE 1: Frances Baard District Municipality in relation to the rest of South Africa. (Data Source: Municipal Demarcation Board).

INTRODUCTION

Wetlands are important ecosystems that constitute irreplaceable natural infrastructure for managing water resources, as well as providing a range of other ecosystem services. Society cannot rely solely on complex and expensive engineering solutions to provide drinking water and to clean waste water. The ecosystem services provided by wetlands include their ability to improve water quality and contribute to the maintenance of base-flows in rivers. In the context of climate change, with predicted increases in the variability and intensity of rainfall events, wetlands have the potential to play a more important role than ever before in mitigating extreme episodes such as floods and droughts.

The natural extent of wetlands in South Africa is low, and individual wetlands tend to be small, with

approximately 300 000 remaining wetlands covering only 2.4 % of the country, ultimately meaning that the consequences of destruction of these small wetland ecosystems are much greater as opposed to what it would have been if wetlands were larger ecosystems covering a larger space of land. It also means that managing and conserving the tiny proportion of the country's surface area covered by wetlands can make a big contribution to improving water quality and to enhancing resilience to climate change through improved flood and drought regulation.

This report draws together the range of knowledge and understanding of wetlands in Frances Baard District Municipality, and provides a detailed overview of the stakeholders and programmes working towards improved wetland management in this region.



1 | WHAT IS A WETLAND?

“Wetlands are 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.”

National Water Act No. 36 of 1998

In simpler terms, a wetland is defined as a feature in the landscape which is saturated with water for a long enough period (either temporarily, seasonally or permanently) that the soils conditions change and the vegetation shifts to respond to these changes.³

1.1 TYPES OF WETLANDS

There are many different types of wetlands found throughout the world, all of which have different functional attributes. As a result, over time, several classification systems have been developed. The United States Environmental Protection Agency (USEPA) has developed a classification system for inland wetland systems based on the hydro-geomorphic characteristics of the wetland. The system classifies wetlands according to the way water moves in, through and out of the system and also takes into account the geomorphological position of the wetland (e.g. slope, crest, valley bottom etc.).

The South African National Biodiversity Institute (SANBI) has compiled a detailed hydro-geomorphic classification system based on the USEPA classification system to assist with wetland identification within South Africa. According to the SANBI *'Classification System for Wetlands and other Aquatic Ecosystems in South Africa'*, six different types of wetlands occur across the country. These vary based on the underlying geology and include seeps, depressions, wetland flats, floodplain wetlands, channelled valley-bottom wetlands and unchannelled valley bottom wetlands.³ An illustrative overview of the different types of wetlands is included as **Figure 4**.



FIGURE 2 & 3: Mottled soils indicative of a wetland (top) and specially adapted wetland vegetation (bottom).³

1.2 CLASSIFYING WETLANDS

Wetlands also vary on a temporal scale based on the climate and season. As such, once a wetland type has been established, it can then be further categorised into either a temporary, seasonal or permanent wetland system depending on the length of time that it remains a feature in the landscape.⁵

A temporary wetland is saturated for a very short period (approximately one to three months) during the rainy season only. Soils are typically characterised by a minimal grey matrix of less than 10 percent of the total soil volume and the occurrence of very few chroma mottles. Vegetation associated with this type of wetland are predominantly grass species, as well as a mixture of other species that occur in non-wetland areas as well as hydrophytic plants that are largely restricted

to wetland areas. In the case of Frances Baard District Municipality, most of the arid wetlands are either bare or host a very sparse cover of salt-tolerant shrubs. The hydrological functions associated with temporary wetlands are not considered to be significant due to the limited surface area of the temporary wetland, the limited water volumes received, absence of the significant aerobic and anaerobic conditions, limited organic matter due to the short periods of anaerobic conditions and the average plant productivity.⁵

A seasonal wetland is saturated for most of the growing season (approximately three to six months). Soils are characterised by a grey soil matrix of more than 10 percent of the soil volume, a high occurrence of chroma mottles and significant periods of wetness

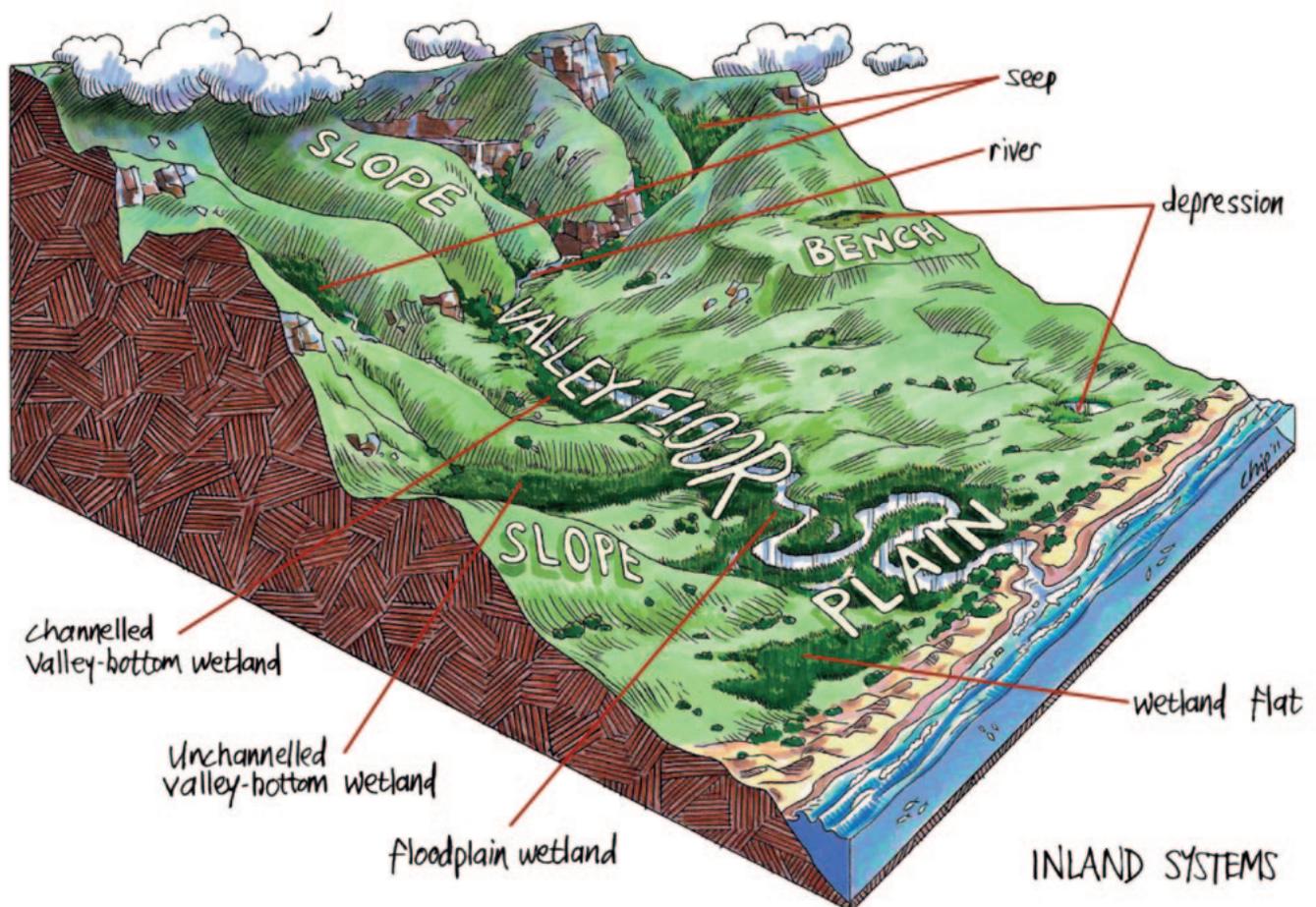


FIGURE 4: Wetland systems within South Africa.⁴

1.2. CLASSIFYING WETLANDS *(continued)*

(minimum of three months). Vegetation associated with this type of wetland are predominantly sedges and grasses that are restricted to wetland areas, usually < 1m tall. In terms of hydrological functions, the seasonal nature of flooding results in aerobic and anaerobic conditions which are more favourable than permanent zones for performing water purification functions. Seasonal wetlands also usually have a lower organic content than permanent wetlands due to prevalence of aerobic conditions, which promotes the decay of organic matter. Efficiency of seasonally wet zones with regards to organic matter is therefore lower than in permanent wet zones, but still contributes significantly to towards water purification with using these processes.⁵

Lastly, a permanent wetland is saturated all year round. Soils are characterised by a prominent grey ('gleyed') matrix, absence of high chroma mottles, saturated throughout the year and a sulphuric odour. This type of wetland is dominated by highly specialised aquatic plants adapted to permanently wet conditions.⁵ Of the three identified temporal wetland types, permanent wetlands are the most efficient at water purification, flood attenuation and stream flow regulation.

For further detail regarding specific wetlands located within the Frances Baard District Municipality, please refer to **Section 3.2** of this report.

1.3 THE VALUE OF WETLANDS

“ *Ecological infrastructure refers to the natural functioning ecosystems that deliver valuable services to people. Ecological infrastructure is the nature-based equivalent of built or hard infrastructure and it is important for providing services and under-pinning socio-economic development.* ”

South African National Biodiversity Institute (SANBI) (2016)

All wetland types can be classified as high value 'ecological infrastructure' due to the large number of ecosystem services that they provide. Wetland ecosystem services can be classified into four separate categories namely 'provisioning services', 'regulating services', 'cultural services' and 'supporting services'.⁶ Provisioning services can be described as the products one can physically obtain from wetlands such as fresh water, food and natural medicines. Regulatory services can be described as the benefits one receives from the wetland such as stream flow regulation, erosion control, water filtration and flood attenuation. Cultural services are the nonmaterial benefits that one can obtain from wetlands such as spiritual enrichment, sense of place and aesthetic experience. Lastly supporting services are the services provided that are necessary for the production of all

other ecosystem services namely, nutrient cycling and water cycling.⁷ Please refer to **Section 3.3** of this report for a detailed description of the ecosystem services that wetlands within the Frances Baard District Municipality provide.

It should be noted that ecosystem services provided by wetlands come at no cost to the municipality and as such, all that needs to be done to ensure continued provision of these services is to protect and maintain local wetlands. However, the inappropriate management of wetlands, can cause a loss of wetland area and subsequent loss of ecosystem services. This results in the municipalities having to invest in expensive infrastructure (e.g. water filtration plants or flood barriers) to ensure the same level of service delivery.

2 | WHAT IS BIODIVERSITY?

‘The variability among living organisms from all sources, including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.’

National Environmental Management: Biodiversity Act No. 10 of 2004

To expand on the above definition, biological diversity or the shorter more commonly used term ‘biodiversity’, is the variety of genes, species and ecosystems on Earth, and the processes that maintain this diversity. It is the living species and natural processes that constitute nature. Rather than simply considering plant and animal populations (i.e. total numbers), biodiversity reflects the variability of plants and animals and crucially, the processes by which they are supported, and the functions that they deliver.

Essentially, as biodiversity includes natural processes, it describes the health and functioning of a given area. For example, if a wetland becomes polluted and its ecological condition deteriorates, it is no longer able to function correctly and natural processes such as providing food (e.g. fish), materials (e.g. reeds) and water purification no longer take place. The real value in the term biodiversity is that by describing the variety

of life forms rather than total numbers, biodiversity can be used at any scale (e.g. for landscapes such as grasslands or a habitat such as a woodland or koppie) to reflect the health of any area – not just wild landscapes, but pockets of biodiversity such as wetlands, too.

To illustrate the concept of biodiversity, compare two areas of the same size. Both areas have 100 animals living in the area. In the first area, there are 20 birds, 70 insects and 10 mice. The insects pollinate the flowers, the birds disperse seeds and the mice provide soil nutrients in the form of droppings so that more seed-producing plants grow. In the second area, all the animals are mice. Over time, they eat more seeds than are being replaced and the area becomes degraded. So we can see that even though both areas have the same total number of animals, the first has greater biodiversity, and is a healthy, functioning ecosystem.



FIGURE 5 & 6: Images of Ganspan Pan: a depression type wetland located within Frances Baard District Municipality (left) and a pair of Red Knobbed Coots (*Fulica cristata*) (right).⁷

3 | WETLANDS AND BIODIVERSITY WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

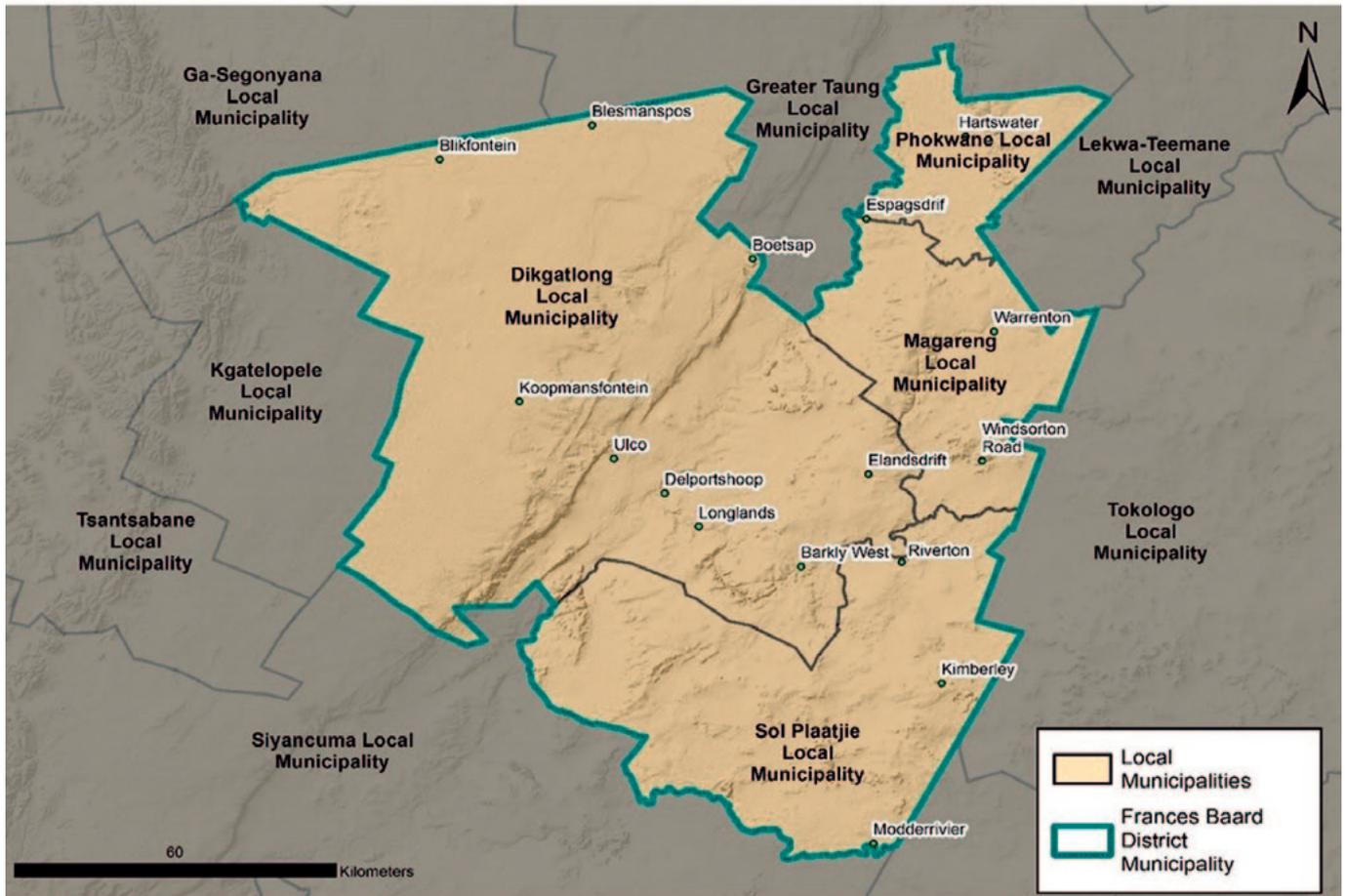


FIGURE 7: Local Municipalities located within Frances Baard District Municipality.

Frances Baard District Municipality (FBDM) is located in the Northern Cape Province of South Africa and covers an area of 23 331 km², making it the smallest district in the Northern Cape. However, it accommodates the largest proportion of the population of the province estimated at 382 088. The district comprises of four local municipalities namely Dikgatlong Local Municipality, Magareng Local Municipality, Phokwane Local Municipality and

Sol Plaatjie Local Municipality. Kimberley, located in Sol Plaatjie Local Municipality, is the capital of the province, and also the home of the District Municipality head offices.

The majority of the Frances Baard District Municipal area is covered by the Savannah and Nama-Karoo Biomes (Mucina & Rutherford, 2006).

3. WETLANDS AND BIODIVERSITY WITHIN FRANCES BAARD DISTRICT MUNICIPALITY *(continued)*

The Savanna biome is the largest biome in South Africa and covers one third of the country (Low & Rebelo 1996). A grass ground layer and a distinct upper layer of woody plants typify Savanna. Tourism and big game hunting are the main economic activities of the area. Environmental concerns within Savanna biome include unsound fire management, bush thickening, spread of alien and invasive plants, crop cultivation, livestock overgrazing and poaching.⁷

The Nama-Karoo biome is the second largest biome in South Africa however is restricted to the central portion of the country. The dominant vegetation associated with this biome is grassy, dwarf shrubland of which less than 1% is formally protected.



FIGURE 8: Three Thorn (*Rhigozum trichotomum*), an indigenous plant species present in the Frances Baard District Municipal region.



FIGURE 9: Sweet Thorn (*Acacia Karoo*), an indigenous plant species present in the Frances Baard District Municipal region.⁸

3.1 MAPPING WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

Currently there is no specific ground-truthed wetland map available which covers the Frances Baard District Municipality in its entirety.

The FBDM Environmental Management Framework (EMF) contains a map indicating the location of wetlands and other waterbodies present in the district.

Using the mapping tool on the SANBI BGIS (Biodiversity Geographic Information System) website, <http://bgis.sanbi.org/MapView>, it is possible to generate a National Freshwater Ecosystem Priority Area (NFPEA) wetland map for a given area with minimal Geographic Information System (GIS) skills (see **Figure 11** for the NFPEA Map of Frances Baard District Municipality). The map generated provides a broad national-level overview of where wetlands are located within the landscape including individual wetlands and clusters of wetlands which are considered to be of regional or national importance. As such, the SANBI NFPEA map can be used as a first-level assessment of wetland occurrence within the municipality.

It should be noted however, that the NFPEA wetland map is based on remote-sensing imagery (which does not always detect features on the ground) and at this stage is largely not ground-truthed. As such the data should be treated with caution and for

initial planning only, as some wetlands may not be reflected (e.g. a number of known seeps occurring within the municipality are not reflected in the NFPEA wetland map whilst a number of farm dams are). Despite these limitations, the NFPEA wetland map is thought to provide the best indication of true wetland distribution data across the country and although the spatial representation of wetlands cannot be considered as definitive, it does provide an indication of relative wetland occurrence, size and density across the municipality.

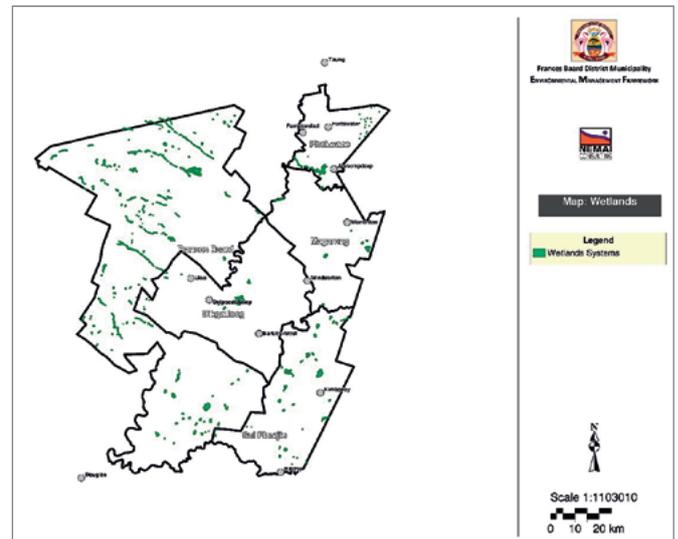


FIGURE 10: FBDM EMF map indicating wetland ecosystems occurring in the municipal region.

3.1 MAPPING WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY *(continued)*

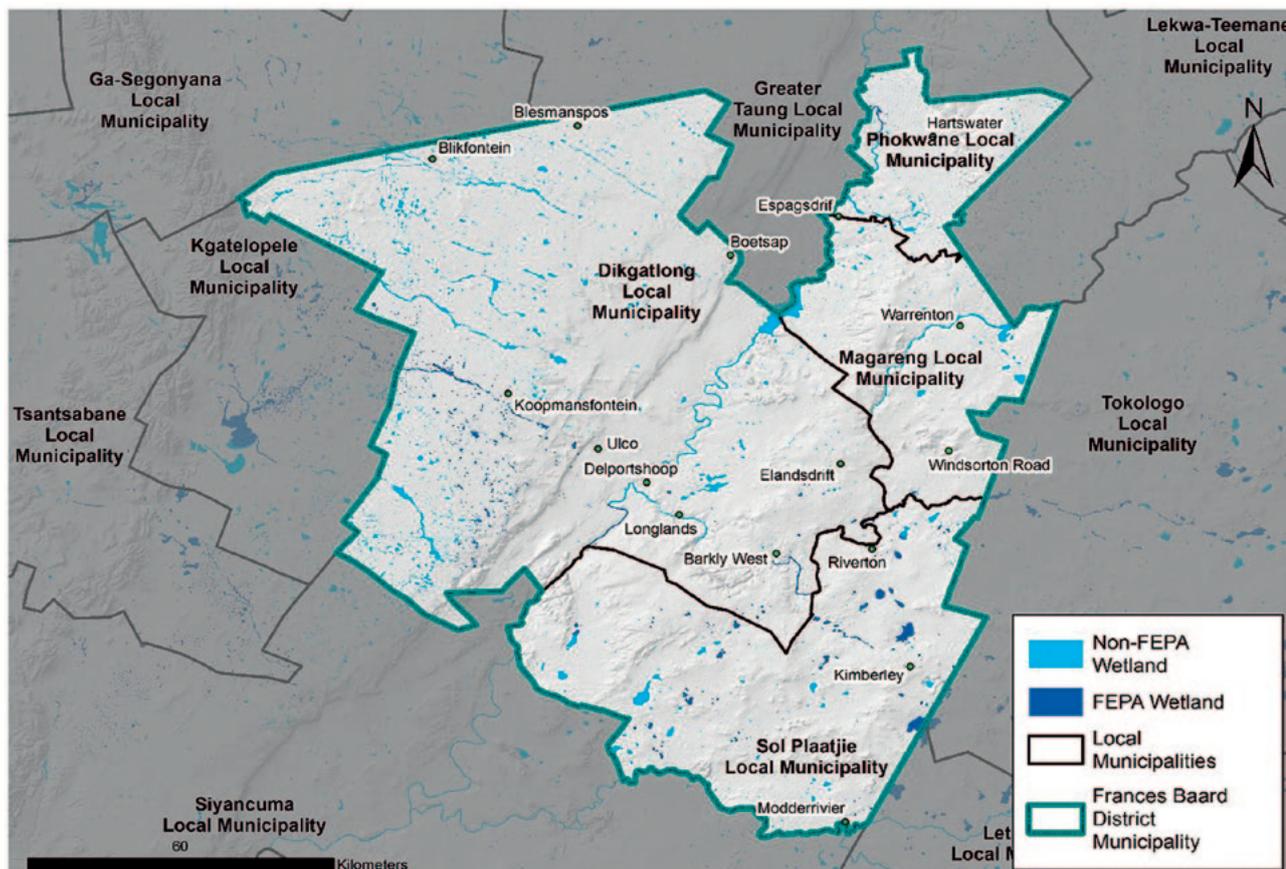


FIGURE 11: Map indicating the spatial distribution of the NFEPA wetlands within Frances Baard District Municipality.

3.2 KEY WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

The Frances Baard region, like the greater Northern Cape Province as a whole, is predominately an arid and/or semi-arid dryland region. Waterbodies such as wetlands are important dynamic ecosystems, ensuring water security in the ever changing climate. The types of wetlands found in the Northern Cape include sponges, bogs, swamps, marshes, dams, springs and pans amongst others.

Although all wetland ecosystems are important, this section seeks to highlight a few key wetlands in the FBDM, primarily focusing on Kamfers Dam, Benfontein and Spitskop Dam, which are classified as Important Bird and Biodiversity Areas (IBA) within the district.



FIGURE 12: Near threatened Lesser Flamingo (*Phoenicothaias minor*) found at Kamfers Dam.⁹

3.2 KEY WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

(continued)

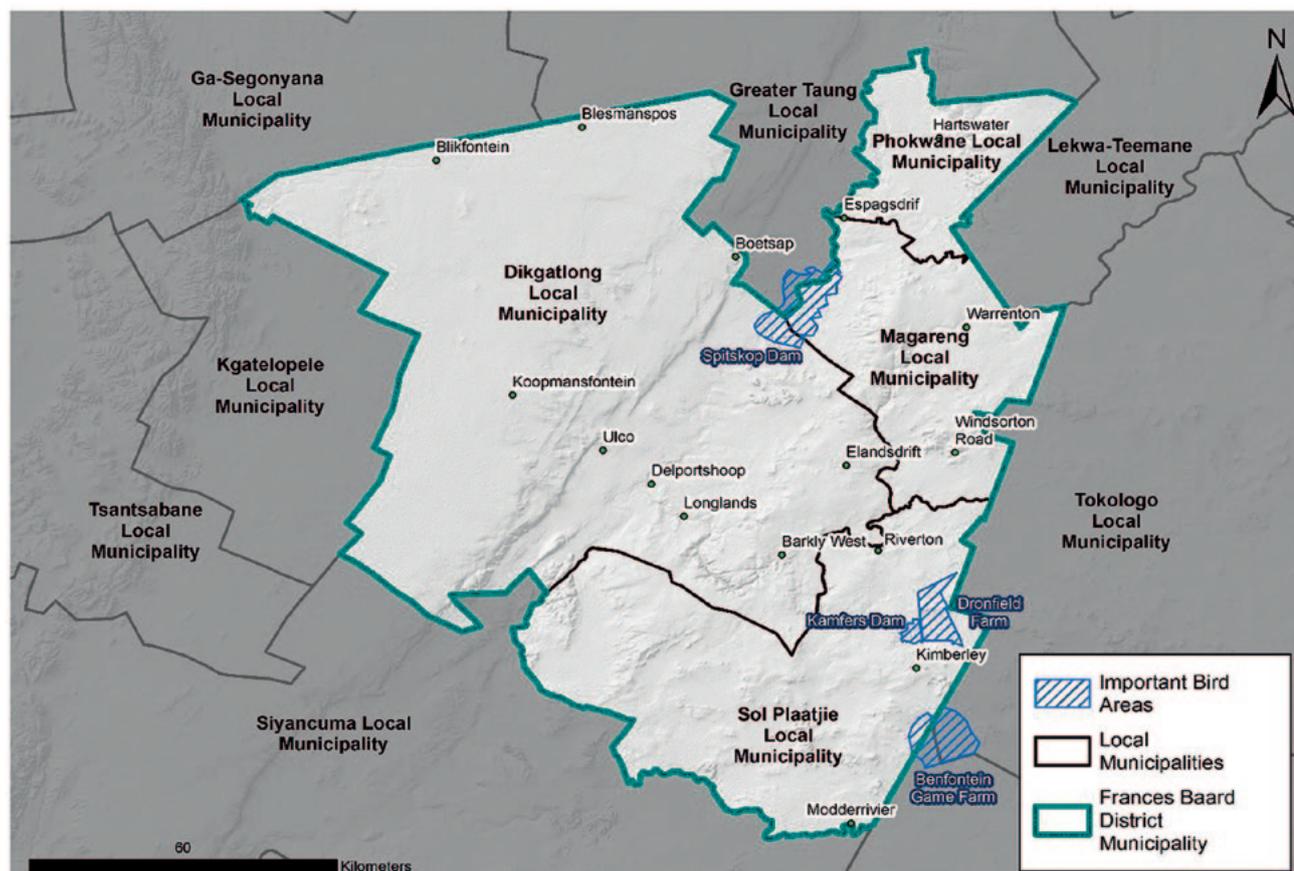


FIGURE 13: A location map of the IBA's found within Frances Baard District Municipality.¹⁰

3.2.1 Kamfers Dam

Arguably the most famous of waterbodies in the entire district, Kamfers Dam is located 6 km north of Kimberley in the ecotone where three major biomes – Kalahari Savanna, Grassland and Nama Karoo meet. The dam is natural in origin as it forms part of the central South African pan system known as the Highveld Salt Pans. It is an ephemeral (non-perennial), endorheic pan of c. 500 ha in extent, receiving water from its 160 km² catchment, 30–40 mega litres of partially treated sewage effluent from Kimberley per day and half of the town's storm-water runoff. Over the past 15 years it has been transformed from an ephemeral pan to a permanent wetland due to an increase in sewage effluent inflow. There are high concentrations of major cations and nutrients in the pan. The pan is fairly well researched in terms of water quality, algae and invertebrates. Currently toxic cyanobacteria (which are a health hazard) do

not appear in the pan. This needs serious attention as it can eliminate all the birds in the pan if there is an outbreak.¹¹

The partially treated sewage effluent from the Homevale Waste Water Treatment Works (HWWTW) has caused this aquatic ecosystem to become eutrophic and rich in phosphates and other minerals, resulting in the establishment of extensive reed beds and sedges. The waterbody's alkalinity has increased significantly. The sewage also promotes the growth of up to 26 species of phytoplankton (algae) in the dam, of which the blue-green algae (*Arthrospira fusiformis*) and diatoms (*Cyclotella spp.*) are usually the most abundant. As a consequence, this IBA supports large numbers of waterbirds. In such dynamic aquatic ecosystems, waterbird species and numbers change with fluctuating water quality and water levels.¹²

3.2 KEY WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

(continued)



FIGURE 14 & 15: Aerial image of Kamfers Dam¹³ and the endemic plant species (*Titanopsis calcarea*) found at Kamfers Dam.¹⁴

Kamfers Dam plays refuge to large numbers of bird species and provides suitable habitat for plant species. The wetland is currently the only breeding locality in South Africa for the Lesser Flamingo (*Phoenicurus minor*) – which is listed as “Near-threatened” in national and international red data books, mainly because of a declining population, few breeding sites, and human induced threats to the breeding sites.

The wetland has been passionately researched and studied by numerous entities, receiving attention not only for its importance in terms of bird and plant life, but also the important ecosystem services the wetland could potentially provide. The wetland needs to be conserved and protected and impacts from development and infrastructure need to be mitigated to ensure the continuous functioning of the wetland; and enhance the potential for co-benefits such economic development through ecotourism.

3.2.2 Benfontein

Benfontein is situated 14 km south-east of Kimberley and consists of a series of flat plains on the central South African plateau at an altitude of about 1 180 m above sea level. A large calcrete pan (300 ha in size and c. 6 km in length) in the north-west fills with water during good rains, creating a fertile shallow wetland.

Specialised salt-tolerant plant communities surround the pan and two prominent drainage lines flow into it from the east. Away from the pan, the ground levels off and red Kalahari sand occurs to the south-east. Underlain by calcareous tufa, the sand becomes deeper to the south. A few dolerite hills occur along the southern and south-western boundaries of the farm.

The vegetation is mostly semi-open Savannah consistent with the Savannah and Nama-Karoo Biomes. Dominant vegetation types include the Highveld Salt Pans vegetation and the Kimberly Thornveld vegetation. The Highveld Salt Pans vegetation type is classified as Least Threatened (hardly protected and with 96.5 % remaining intact). The Kimberly Thornveld is also listed as Least Threatened (poorly protected and 82.3 % intact). In the Kimberly Thornveld, the vegetation generally consists of Camel Thorn (*Vachellia erioloba*) and several tall grass species. The grass layer is complex and is dominated by love grass species (*Eragrotis*), silky awn grass species (*Stipagrotis*) and stick grass species (*Aristida*). After good rains the flat country in the east becomes grassy, with red grass (*Themeda triandra*), turpentine grass (*Cymbopogon plurinodis*) and love grasses dominating.

3.2 KEY WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

(continued)

Most of the terrestrial habitats remain in a natural state, with some transformation resulting from the development of farm buildings, a farm dam, dumps and a large borrow pit. The site in essence is well protected, although the effects and impacts of climate change are being experienced. The Benfontein IBA is still a suitably chosen refuge for a vast array of animal and plant species. Key bird species present

at the wetland include the beautiful Kalahari Scrub Robin (*Erythropygia paena*) (refer to Figure 16).

According to the IBA 2015, there is a real need to manage the spread of the invasive Mesquite plant (*Prosopis glandulosa*). The conservation of the White-backed Vulture also needs to be prioritised by putting in and ensuring adequate protection of all its breeding colonies in the Benfontein region.



FIGURE 16 & 17: Image of a Kalahari Scrub Robin (*Erythropygia paena*) (left) and Red Grass (*Themeda triandra*) (right), two of the many species found at at Benfontein.¹⁴



FIGURE 18: Image of the invasive Mesquite plant (*Prosopis glandulosa*).¹⁵

3.2 KEY WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

(continued)

3.2.3 Spitskop Dam

Spitskop Dam lies 33 km south-west of Jan Kempdorp and 27 km west of Warrenton. This is one of the largest wetlands in the semi-arid Northern Cape region. It holds water permanently and provides vital habitat for flora and fauna when many other ephemeral and temporary wetlands within the region have dried up. The dam's major inflow is from the Harts River.

This IBA falls within the Savanna Biome and Eastern Kalahari Bushveld Bioregion. There are two main vegetation types, and the ecosystem status for both the Schmidsdrif Thornveld and Kimberley Thornveld is Least Threatened. The thornveld is dominated by Umbrella Thorn (*Vachellia tortilis*), Black Thorn (*Vachellia mellifera*), Camel Thorn (*Vachellia erioloba*), Sweet Thorn (*Vachellia karoo*) and Shepard's Tree (*Boscia albitrunca*). The shrub layer is moderately developed in places and includes Camphor Bush (*Tarchonanthus camphoratus*) and Raisin Bush (*Grewia flava*). The grass layer is sparse. The water's edge where the Harts River flows into the dam is dominated by the Common Reed (*Phragmites australis*), which also occurs in patches along the dam shoreline.

Approximately 30 % of the terrestrial area of this IBA is in a natural state and 70 % has been degraded or transformed. As is the case with many other wetlands in South Africa, Spitskop Dam has been severely

affected by human activity. It is a highly disturbed site as a result of years of continuous degradation due to excessive livestock grazing and pollution from agricultural pesticides and fertilisers.¹⁷



FIGURE 19: Image of the Common Reed (*Phragmites australis*) found at Spitskop Dam.¹⁶

3.3 THE VALUE OF WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

As outlined in Section 1: “What is a Wetland”, wetlands provide innumerable goods and services to local communities and municipalities in the form of provisioning, regulatory, cultural and supporting

services. The following ecosystem services have been identified as being prominent in Frances Baard District Municipality and are summarised in Table 1 below.

TABLE 1 ECOSYSTEM SERVICES IDENTIFIED WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

ECOSYSTEM SERVICE TYPE	ECOSYSTEM SERVICE	DESCRIPTION/CASE STUDY
Provisioning	Food	Local communities living within Frances Baard District Municipality harvest local plants and fish to support their diets. Local communities also use the wetland fringe zones for informal cultivation/small scale farming and plant and harvest various crops.
	Clean drinking water	Local communities living within Frances Baard District Municipality, particularly those located in the more rural areas, use clean water supplied by the wetlands for drinking purposes.
	Medicinal plants	Many of the plants growing within and around wetlands have natural medicinal properties. Local communities living within Frances Baard District Municipality harvest these plants to maintain/improve their personal health.
	Raw materials	Wetlands provide a significant number of raw materials which directly contribute to local livelihoods and income. Local communities living within Frances Baard District Municipality harvest reeds from the wetlands to make baskets and furniture and grasses for thatching.
	Grazing Land	Local communities, living particularly in the more rural areas, use the wetlands as pasture for their livestock.
Regulatory	Water storage and stream flow regulation	The local wetlands within Frances Baard District Municipality store stormwater runoff and slowly release the water as the water table drops. This contributes to sustained streamflow throughout the year.
	Flood attenuation and control	Wetlands and the associated plants play a crucial role in flood attenuation as they have the ability to absorb flood water and reduce the velocity of the water moving through the system. This contributes to the protection of agricultural land as well as infrastructure downstream.

continued

3.3 THE VALUE OF WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY *(continued)*

TABLE 1 ECOSYSTEM SERVICES IDENTIFIED WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

ECOSYSTEM SERVICE TYPE	ECOSYSTEM SERVICE	DESCRIPTION/CASE STUDY
Regulatory	Erosion control	Wetland plants, strengthen the banks of wetlands and thereby contribute to sediment stabilisation and soil retention within the catchment.
	Water filtration and purification	Wetlands and wetland plants contribute substantially to improving water quality by filtering and purifying water as it moves through the system. Wetlands have the ability to modify or trap a wide range of substances commonly considered to be pollutants including suspended sediment, excess nutrients, phosphorus, nitrogen, pesticide residue, industrial effluent, pathogenic bacteria and viruses. ¹⁸ As such, high concentrations of the above are prevented from reaching groundwater supplies or surface water downstream thus contributing to clean drinkable water.
	Buffer the impacts of climate change	Wetlands have the ability to protect both coastal and inland areas against the effects of climatic change Please refer to Section 4.2 for more detail in this regard.
Cultural	Tourism	Due to their natural beauty and diversity of plant and animal life, the wetlands, particularly Kamfers Dam, within Frances Baard District Municipality are popular tourist destinations.
	Recreation	The wetlands within Frances Baard District Municipality are used extensively for recreation purposes. Activities undertaken within these wetlands include, birding, frogging, canoeing, bike riding, and hiking, picnicking along the banks of the wetland systems and fishing.
Supporting	Nutrient recycling	Wetlands naturally slow down the flow of water, thereby promoting the deposition and retention of nutrients. These are then utilised by the microbial species living in the wetland habitat which are in turn eaten by larger species such as prawns and blood worms.
	Supporting habitat	A large variety of bird, fish and invertebrate species are dependent on the wetlands within Frances Baard District Municipality for at least part of their lifecycle. Wetlands provide vital breeding and foraging ground for a variety of bird species as well as breeding, courtship and foraging ground for a variety of frog species.

3.4 THREATS TO WETLANDS

Despite the huge benefits that wetlands provide in terms of ecosystem services, 50% of wetlands in South Africa have already been lost and 48% of the remaining wetlands are critically endangered and/or degraded.¹⁹ This loss is a direct result of historical degradation, pollution and deliberate draining of wetlands to make way for development and expansion (both urban and agricultural). Damage to wetlands results in increasingly limited functionality and subsequently a decrease in the ability to provide valuable ecosystem services.

Following verbal communications with active stakeholders working within Frances Baard District Municipality, it has become clear that wetlands face a significant number of threats within the municipality, all of which have the ability to severely compromise function and provision of ecosystem services or

degrade the wetland entirely. The key threats to the wetlands located within Frances Baard District Municipality have been identified as follows:

3.4.1 Sewage

Sewage spillages and flow are impacting wetlands across the country, no more so than in the Frances Baard area. Looking at Kamfers Dam in particular, which receives water from the Homevale Waste Water Treatment Works (HWWTW), the wastewater from residential and industrial areas occasionally exceed the hydraulic capacity of the plant, causing millions of litres of untreated waste water to enter Kamfers Dam daily (Hill *et al.* 2013). This results in a rise in water levels and an increase in water pollution. There is a pressing need to investigate and address the issue around the quantity and quality of water entering the wetland by all relevant stakeholders.



FIGURE 20: Algal bloom at Kamfers Dam – March 2010.

3.4 THREATS TO WETLANDS *(continued)*

3.4.2 Mining

Mining is arguably the biggest sector in the Frances Baard area. Mining for diamonds and other minerals has been a primary source of income to the population for many years. The activities associated with mining, particularly excavation and stockpiling of discarded soil, have irreversibly destroyed many of the wetland areas within close proximity of these mines.

This threat to wetlands is increasing, as a rising applications are continuously being submitted, particularly for areas near important wetland ecosystems within the district. If these applications are granted and the mining activities are not properly regulated, it will result in further irreversible wetland loss within Frances Baard District Municipality.

3.4.3 Historical degradation

Historically, due to limited knowledge on the value of wetlands and their ecosystem services, wetland areas were seen as waste lands. As such, wetlands throughout Frances Baard District Municipality were deliberately drained and infilled in order to 'reclaim the land' for commercial, agricultural and even urban uses.

3.4.4 Urban development

Wetlands throughout Frances Baard District Municipality are at risk from both formal and informal urban development and expansion. Due to increasing population, particularly in areas such as Kimberley, development is being taken right up to, and sometimes beyond, the urban edge threatening wetlands near the vicinity of the urban edge. Additionally, due to limited knowledge of where wetlands are on the ground both within and outside of the urban edge, the development process often entails the accidental draining or infilling of wetlands to make room for these developments.

In addition to the expansion of formal, planned urban development, there is also an increase in informal developments expanding beyond the formally recognised urban edge as well as an expansion of established villages in the more rural areas. Due to lack of formal planning, these informal developments are more often than not located inappropriately in wetland areas due to the close proximity to water. This not only increases the risk and exposure of communities to environmental hazards such as flooding, but the development of informal settlements within wetland areas often brings with it waste disposal into and around the wetland area. Expansion of the village areas also additionally brings an increase in livestock grazing within the wetland areas as well as clearing of the indigenous plants to make way for subsistence farming. This land use change compromises the wetlands' ability to perform valuable ecosystem services such as water filtration resulting in poorer water quality moving downstream.



FIGURE 21: Development adjacent to the Ganspan Pan in the Frances Baard District Municipality.

3.4 THREATS TO WETLANDS *(continued)*

3.4.5 Pollution and Dumping

As a result of expanding urbanization in close proximity to wetland areas, combined with ageing and failing waste water treatment infrastructure and poor stormwater runoff monitoring and management, the wetlands within Frances Baard District Municipality are also at a very high risk from polluted stormwater runoff as well as from sewerage seeping into wetland areas.

Dumping within wetland areas has also become increasingly prevalent. The effect of this includes increased nutrient loads as well as *E.coli* levels within wetland systems which negatively affects both the

water quality of the water moving through the system as well as the delicate biodiversity depending on these systems for survival.

3.4.6 Agricultural practices

Unsustainable agricultural practices occur extensively throughout the district, leading to numerous impacts on both wetland and river systems. Crop production in particular is seen as a huge concern as the associated nutrient runoff from fertilisers and pollution from chemicals such as pesticides contributes negatively on wetlands and rivers, destroying vegetation and animal life in the process.



FIGURE 22: Image depicting a small tributary where the water filtration capabilities of wetlands higher up in the catchment is illustrated. The brown water on the left has moved through a wetland that has been compromised by land use change whilst the clear water on the right has moved through a pristine wetland that has not been impacted by human activities.

4 | DISASTER MANAGEMENT AND CLIMATE CHANGE

“Disaster means a progressive or sudden, widespread or localised, natural or human-caused occurrence which is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.”

Disaster Management Act No. 57 of 2002

4.1 DISASTER RISK MANAGEMENT WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

The Disaster Management Act (Act No. 57 of 2002) stipulates that every Metropolitan and District Municipality within South Africa must establish and implement a framework for disaster management within the municipality. This is to ensure that each municipality takes responsibility for hazard monitoring and risk mapping (“disaster risk assessment”), takes the necessary remedial steps to prevent and/or mitigate the occurrence or re-occurrence of disasters in their area of jurisdiction and that there is an integrated and uniform approach to disaster management.

FBDM appointed Watees Consulting PTY Ltd to compile a Disaster Management Plan. The main purpose of the Disaster Management Plan (DMP) is *inter alia* to implement appropriate disaster risk reduction measures to reduce the vulnerability of communities and infrastructure at risk. The DMP is in line with national policy (National Disaster Management Framework), which requires the following:

- The compilation of a Disaster Management Framework (policy).
- The execution of a detailed disaster hazard, vulnerability and risk assessment.
- The compilation of disaster risk reduction measures.

- The compilation of appropriate Standard Operating Procedures (SOP’s).
- Establishment of a District Disaster Management Centre (DDMC).
- Establishment of a Disaster Management Advisory Forum.
- Capacity Building, training and awareness programmes.

Hence, to accommodate the above-mentioned requirements, the DMP for FBDM comprises various plans, namely;

- District Disaster Management Framework (policy).
- Disaster Hazard, Vulnerability and Risk Plan.
- Disaster Risk Reduction Plan.
- Disaster Response and Recovery Plan (SOPs and checklists).
- District Disaster Management Centre Plan.
- Guidelines to establish the Disaster Management Advisory Forum and Volunteer Contingent.

4.1 DISASTER RISK MANAGEMENT WITHIN FRANCES BAARD DISTRICT MUNICIPALITY *(continued)*

4.1.1 Risk identification and mapping

Whilst no formal mapping of the risks to the municipality has been undertaken as yet, using indigenous knowledge, it was possible to identify some of the key potential hazards in the FBDM area of jurisdiction.

Identified hazards for FBDM with a direct or indirect bearing on wetlands include:

- Floods
- Drought
- Sink holes
- Veld fires
- Mines
- Sewage Works²¹

4.1.2 Role of Wetlands in Disaster Risk Mitigation

As noted in **Section 3.3**, wetlands are considered to be high-value “ecological infrastructure” as they provide a substantial number of ecosystem services to the surrounding local area as well as downstream. Wetlands also have the natural ability to buffer and reduce the impacts of a substantial array of disasters including flooding, inconsistent water supply, drought, and soil erosion, loss of biodiversity and groundwater pollution. Given that some of these have been identified as major risks to Frances Baard District Municipality, wetlands can play a key role in disaster risk mitigation within the district. This is summarised in **Table 2** below.

TABLE 2 ROLE OF WETLANDS IN DISASTER RISK MITIGATION WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

DISASTER	ROLE OF WETLANDS IN DISASTER RISK MITIGATION ²²
Flooding	Wetlands have the ability to reduce the velocity of flowing water and absorb some of the water into the wetland system. As such, rather than the flood water moving through the system in one go, water is retained and released at a slower rate. This means that not only is the intensity of the flood reduced or prevented all together (thereby reducing the potential impact on infrastructure and housing downstream) but there is sustained water flow long after the rainfall event.
Inconsistent Water Flow & Drought	Wetlands have the ability to act like sponges in that throughout the rainy season they absorb water. During the dry season, and even in times of drought, this water is slowly released thereby ensuring that rivers and streams maintain sustainable flows and supply continuous water despite lack of rainfall.
Soil Erosion	Due to the fact that wetlands are covered by specially adapted vegetation, little to no erosion occurs in wetland areas as the wetland plants have the ability to stabilise and bind the soil, reducing the risk of top soil loss downstream.
Loss of Biodiversity	Wetlands can be considered as biodiversity hotspots in themselves as they provide key habitat to a number of plant and animal species. Often these species are considered to be unique and are completely dependent on the system. Maintaining healthy wetlands therefore can contribute to halting loss of biodiversity within the municipality.
Groundwater Pollution	Wetlands have the ability to purify water by trapping pollutants, sediments, excess nutrients (especially nitrogen and phosphorus), heavy metals, disease-causing bacteria and viruses, and synthesized organic pollutants such as pesticides, thereby ensuring that the water leaving the wetland is cleaner than the water that entered it.

4.2 CLIMATE CHANGE AND WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

‘Climate change’ means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

United Nations Framework Convention on Climate Change (UNFCCC)

In simpler terms, climate change can best be described as a long term change in the Earth’s global climate patterns including shifts in historical seasonality, rainfall patterns and average temperature ranges. These shifts are caused by an increase in global temperatures which are caused by increasing greenhouse gases (e.g. carbon dioxide) being emitted into the atmosphere. The rise of greenhouse gases in the atmosphere is caused by large scale human activities including industry, agriculture, transport and land use change. As a result, the long term historical climate is shifting towards unstable and unpredictable future climate conditions.

4.2.1 Historical Climate within Frances Baard District Municipality

Frances Baard District Municipality falls within the Northern Cape Province of South Africa and has a subtropical, low latitude semi-arid climate resulting in hot, wet summers and mild, dry winters.

In terms of temperature, historically there has been a strong seasonality between the winter and summer months. The cooler winter months occur between May and August whilst the warmer summer months occur between November and February. As illustrated in **Figure 23** the coolest month has been June whilst the hottest months have been between December and January. The records indicate that there has been moderate temperature variation between the winter and summer months.²³

Rainfall is largely experienced from October to April with the highest amount of rainfall falling in the late summer months (February to March). Frances Baard District Municipality also experiences summer thunder storms as well as hail storms, both of which are associated with periods of heavy flooding. Winter rainfall within Frances Baard District Municipality is considered to be rare.

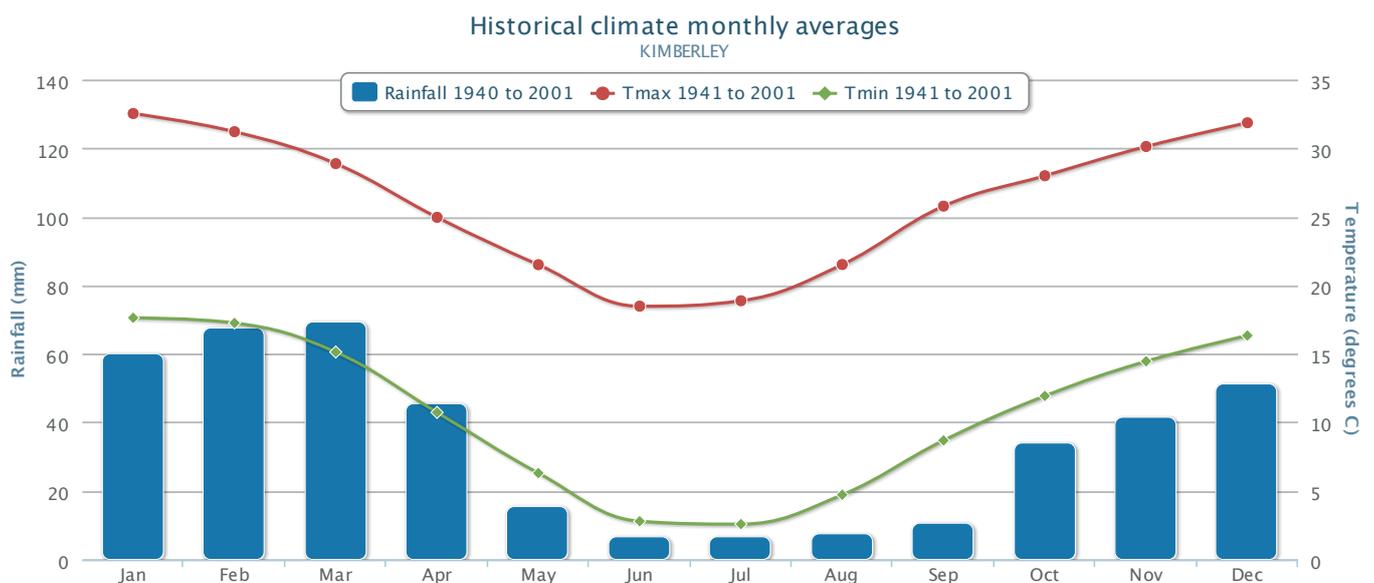


FIGURE 23: Graph depicting the typical climate of Frances Baard District Municipality.²¹

4.2 CLIMATE CHANGE AND WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY *(continued)*

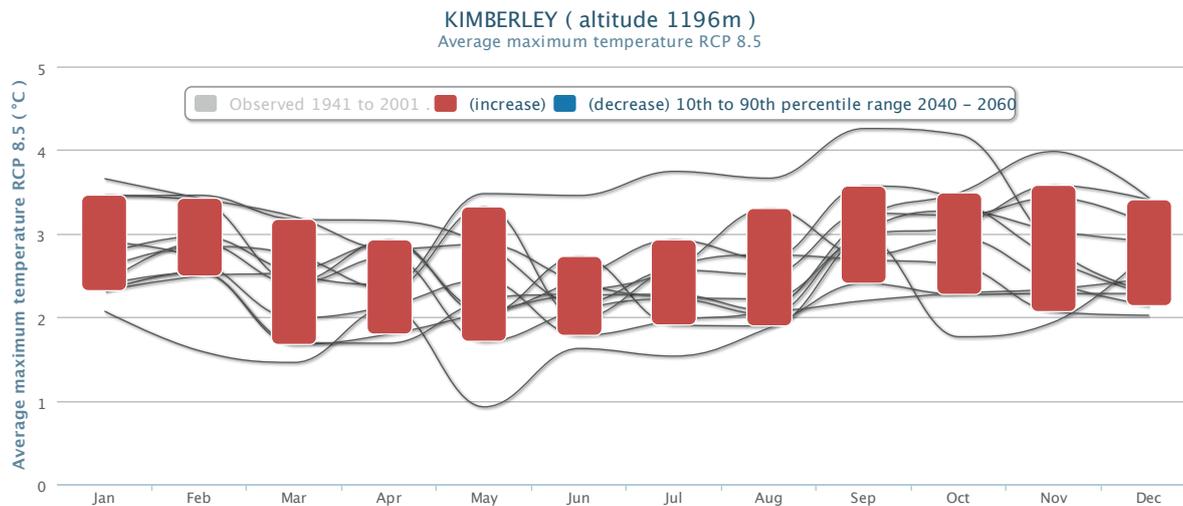


FIGURE 24: Graph depicting the anticipated changes in average maximum temperature patterns for Frances Baard District Municipality.

4.2.2 Projected Climate Change within Frances Baard District Municipality

The Climate Systems Analysis Group (CSAG) from the University of Cape Town (UCT) have developed the Climate Information Platform (CIP) which provides real time climate information. The CIP runs a series of climate models which collectively provide a database of historical climate patterns as well as future projections for regions and districts throughout the world.

Temperature:

In terms of temperature, the climate models all agree that warming within Frances Baard District Municipality will most certainly occur and that there will be a definite overall increase in average monthly temperatures by 1–1.5°C. The data also indicates that early winter temperatures are likely to increase slightly more than summer temperatures resulting in a shorter, milder winter period overall.

Rainfall:

In terms of rainfall, the climate models all agree that a shift in the historical rainfall patterns will most certainly occur. The models do not agree on the direction of change however and as such there is uncertainty as to whether there will be an increase or a decrease in annual rainfall in the municipality.

Despite the uncertainty however, the models do indicate that there will be a shift to generally drier conditions overall throughout the municipality.²³

4.2.3 Impacts of Climate Change within Frances Baard District Municipality

As noted in **Section 4.2.2**, Frances Baard District Municipality is likely to experience an increase in average monthly temperatures as well as a shift in the known historical rainfall patterns. A shifting climate means that the historical seasonality and associated rainfall and temperature patterns no longer apply. The predicted increase in temperature will result in, on average, hotter days throughout the year, as well as an increased duration of hot (> 32°C) and dry spells particularly in the early-mid summer months. The uncertain changes in rainfall patterns however mean that resulting impacts could go one of two ways. Should there be an increase in annual rainfall, there will also most likely be an increase in the magnitude and frequency of storm events (i.e. more severe storms happening more often) resulting in an increased number of severe flooding incidents and hail storms, particularly in the late summer months. Should there be a decrease in annual rainfall however, there will be an increased number of annual dry days resulting in subsequent increased risk of water scarcity and drought conditions within the district.

4.2 CLIMATE CHANGE AND WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY *(continued)*

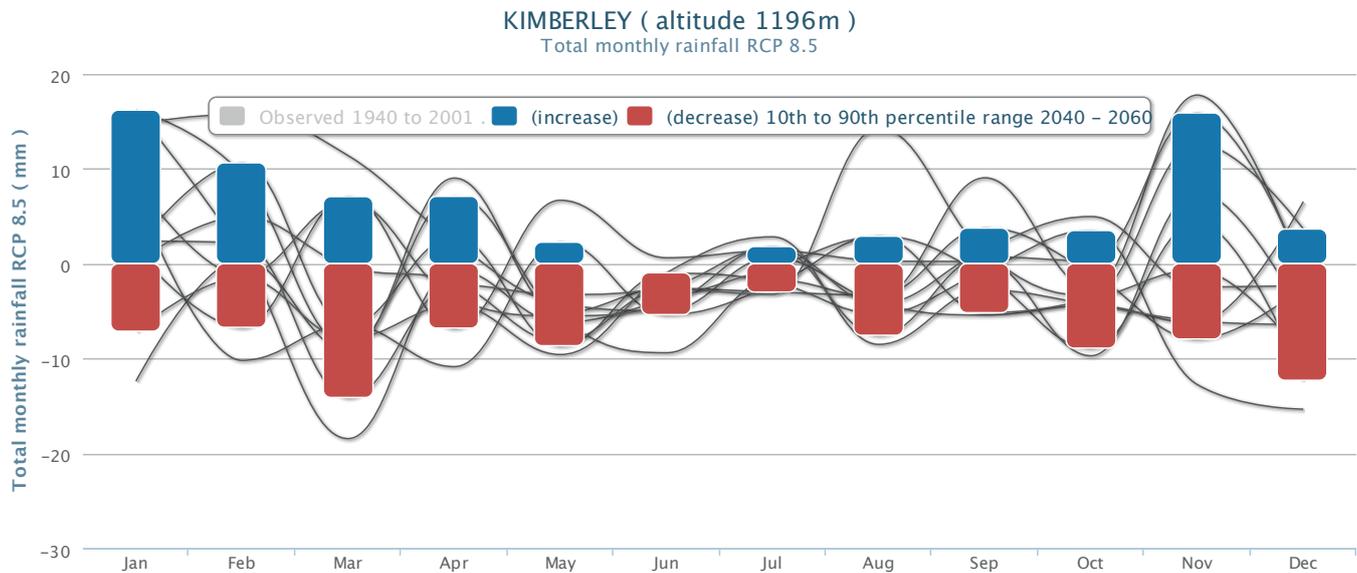


FIGURE 25: Graph depicting the anticipated changes in total monthly rainfall patterns within Frances Baard District Municipality.

In short, climate change in Frances Baard District Municipality will result in an exacerbation of the existing impacts historically occurring within the municipality. As such, Frances Baard District Municipality should continue to plan for historical climate related impacts and be mindful that these impacts will most likely become more severe over time.

4.2.4 Role of Wetlands in addressing the impacts of climate change

Wetlands and their associated ecosystem services provide effective tools for both mitigating and adapting to the impacts of climate change. In terms of climate change mitigation, wetlands, particularly peatland systems, are well known for being carbon sequestering systems (aka “carbon sinks”). That means that wetlands or peatlands have the ability to store excess carbon (via photosynthesis) from the atmosphere – one of the primary components of greenhouse gases and a driver of climate change.²⁴

Protecting wetlands can therefore assist in preventing further climate change by reducing the quantity of carbon in the atmosphere. Drainage and degradation of wetlands however can release significant amounts of this stored carbon back into the atmosphere and reduce the ability of wetlands to sequester additional carbon. Better management practices thus can help protect these stores of carbon and the ability of wetlands to sequester it.

In terms of adaptation, wetlands have the ability to act as natural buffers to the most severe of climate change impacts. For example, wetlands have the ability to soak up heavy rainfall and attenuate flood water protecting the district against the most extreme of floods. Wetlands can also store water and release it slowly in drier times which protects the district against the more severe impacts of drought.

4.2 CLIMATE CHANGE AND WETLANDS WITHIN FRANCES BAARD DISTRICT MUNICIPALITY *(continued)*

Climate change can however have a negative impact on wetlands if they are not in a healthy condition. Wetlands which are in poor condition have a reduced ability to respond and adapt to a shift in climate which means climate impacts (e.g. flooding) are more likely to damage or destroy the wetland. Subsequently the wetland is compromised in its ability to perform vital ecosystem services (including most importantly flood attenuation, water storage and flow regulation) and provide habitat for the specialised species living within and around these wetlands. Healthy wetlands however have a high resilience to climate change impacts, meaning that they are able to maintain their capabilities to supply ecosystem services and

continue to provide key habitat to the specialised flora and fauna despite significant shifts in climate.

Given that healthy wetlands are able to maintain their ecosystem services, they are able to play a highly significant role in reducing the impacts of climate change within the municipality. Investment in the maintenance of healthy wetlands and the rehabilitation and restoration of damaged or degraded wetlands therefore will not only ensure wetland resilience to climate change, but will ensure increased resilience of the municipality itself to the impacts of climate change.

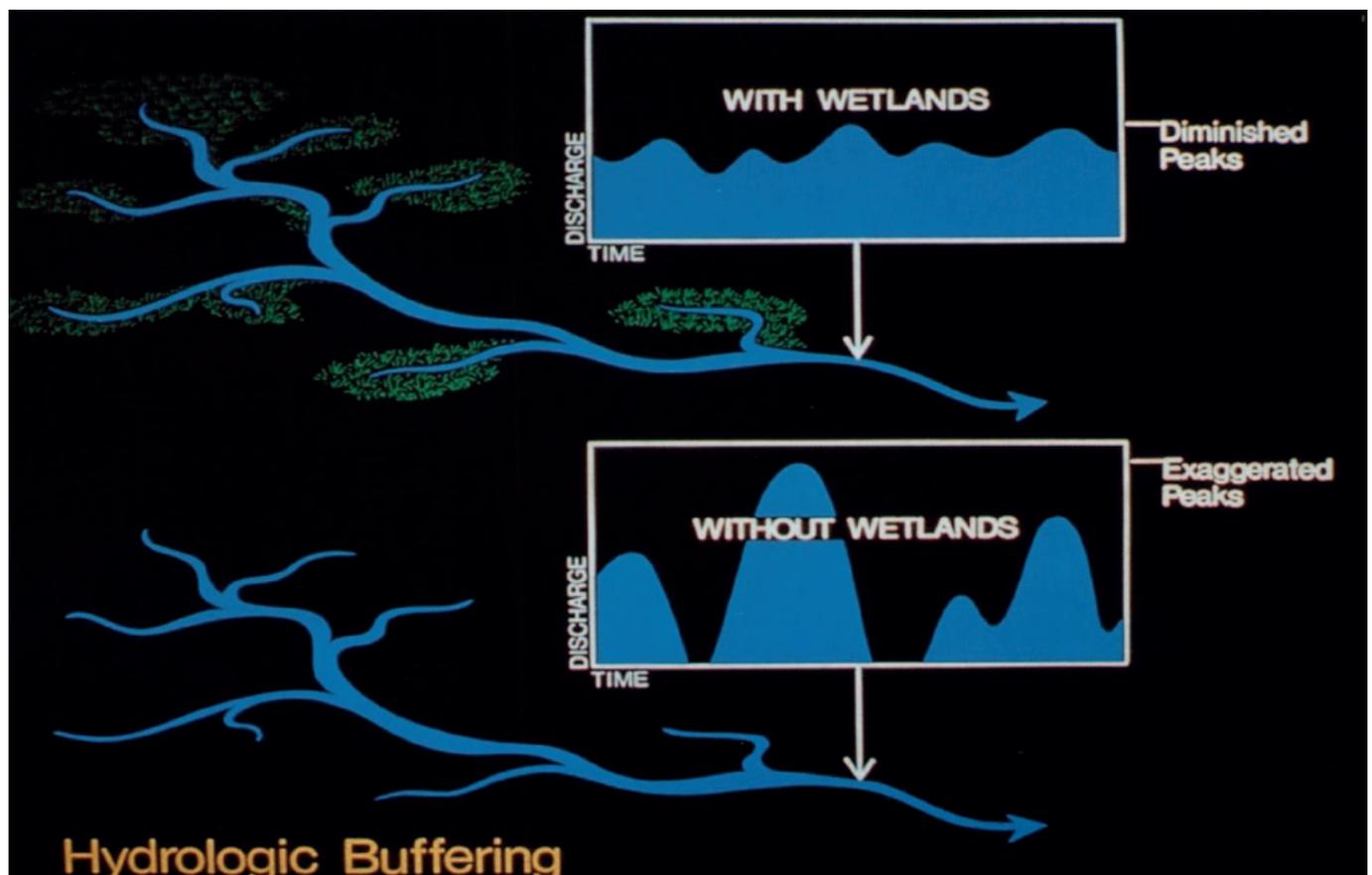


FIGURE 26: Schematic representation on the hydrological buffering capability of wetlands.

5 | GOVERNANCE & MANAGEMENT

South Africa has an extensive legislative framework concerning the environment and biodiversity is considered in both development planning as well as national government priorities. This section outlines

key legislation and policies as well as the governance structure within Frances Baard District Municipality which leads to the current wetland management strategy within the district.

5.1 POLICY FRAMEWORK

The table below (Table 3) provides a comprehensive summary of all South African legislation, policies and strategies pertinent for the management of wetlands within Frances Baard District Municipality. It is important to note that some of the legislation such as the National Environmental Management

Act (NEMA) provides specific instructions regarding wetland management whilst other legislation indirectly supports management of wetlands such as the National Environmental Management: Waste Act (NEM:WA).

TABLE 3 LEGISLATION GOVERNING WETLAND MANAGEMENT WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

LEGISLATION/POLICY/STRATEGY	HOW IT RELATES TO WETLANDS
Legislation	
South African Constitution	Overarching principles of care for the environment.
Environmental Conservation Act and associated By-Laws	Controls access to and activities within coastal and wetland areas.
National Water Act	Water use control, including extraction and construction within the vicinity of a watercourse or wetland.
National Environmental Management Act	Environmental impact assessments (EIAs) for the development of a new or disturbed site within the vicinity of a watercourse or wetland.
National Environmental Management: Biodiversity Act	Protection of biodiversity and the formulation of a number of tools (e.g. bioregional plans and threatened ecosystem lists) that feed into land use planning and EIA procedures.
National Environmental Management: Biodiversity Act – Alien and Invasive Species Regulations	All matters related to invasive species management (both fauna and flora).
National Environmental Management: Protected Areas Act	Protection of national parks, protected areas and conservation sites. This includes the protection of wetland site.
National Environmental Management: Waste Act	Regulation of illegal dumping.
Conservation of Agricultural Resources Act	Protect the utilization of the natural agricultural resources to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invasive plants.

continued

5.1 POLICY FRAMEWORK *(continued)*

TABLE 3 LEGISLATION GOVERNING WETLAND MANAGEMENT WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

LEGISLATION/POLICY/STRATEGY	HOW IT RELATES TO WETLANDS
Municipal Systems Act	Role of local governments and the requirements for Integrated Development Plan (IDP), Spatial Development Framework (SDF) and Disaster Management Plans.
Municipal Structures Act	Promotion of regional planning and spatial planning categories.
Municipal Health Act	Monitoring of Waste Water Treatment Works (WWTW) discharge.
Policies	
National Development Plan (NDP), and associated Medium Term Strategic Framework (MTSF).	Sets out measures to protect natural resources in South Africa. Through the creation of the MTSF and associated 'Delivery Agreements', required outputs and targets are set.
Municipal Planning	
Provincial Strategic Development Framework (SDF)	Overarching spatial planning guidelines for the province.
Integrated Development Plan (IDP)	Overall strategy document for the municipality.
District SDF	Broad spatial planning guidelines for the district (including a map of land use within the district).
Local Municipal IDPs	Overall strategy document for the local municipalities linking to the district level IDP.
Local Municipal SDFs	Strategic plans to manage municipal land at the local level.
Open Space Framework	Demarcation of Open Space Areas.
Environmental Management Framework	Map and land use guidelines for areas of environmental importance.
Sector Plans	This includes the Disaster Management Plan.
Strategies	
The National Biodiversity Framework	Provides biodiversity targets for South Africa.
National Water Resource Strategy	Speaks to protection and rehabilitation of wetlands.
Other	
Bioregional plans (draft or gazetted)	Maps Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).
Spatial Planning and Land Use Management Act (SPLUMA)	Provides a framework for spatial planning and land use management in South Africa. It also stipulates that municipal planning is primarily the executive function of the local sphere of government and requires that biodiversity is adequately considered in spatial planning.
Disaster Management Amendment Bill	Outlines how ecosystems should be considered in the updated Disaster Management Act.

5.1 POLICY FRAMEWORK *(continued)*

Taking the aforementioned legislation into account, the vision and mission for Frances Baard District Municipality as per the current IDP (2012–2017) are currently as follows:

Vision: “To be a municipality with a clear development focus to improve the quality of life of all communities in the district”.

Mission: “To promote the quality of services and thereby improving the standard of living of all its communities by:

- Promoting social and economic development.
- Promoting the provision of sustainable, affordable and optimal quality of service.
- Utilizing all available resources economically, efficiently and effectively.
- Effective community participation of all stakeholders”.

5.2 WETLAND MANAGEMENT WITHIN FRANCES BAARD DISTRICT MUNICIPALITY

Currently there is no specific designated wetland management authority within Frances Baard District Municipality.²⁵ Instead, the management of wetlands is a collective but disconnected effort between the various departments of the municipality, the four local municipalities within the district, and other interested and affected parties’ including DENC, DWS, and SAEON.

At this stage, management of wetlands is extremely fragmented across FBDM. The district and local municipalities work from separate IDPs with different mandates as such, environmental management within the individual municipalities is not consistent.

In light of the above, in order to ensure holistic and effective management of wetlands within Frances Baard District Municipality, the same vision and standardised goals for the management of wetlands need to be incorporated into the IDPs and SDFs of both the local and district level municipalities.²⁵ It would also be ideal if Frances Baard District Municipality could provide support to the local municipalities where possible in order to assist with the identified capacity constraints within these municipalities. Additionally, re-establishing platforms such as the Northern Cape/Free State Wetlands Forum (NC/FSWF) will ensure improved communication between both the district and local municipalities as well as the parastatals and private landowners to manage wetlands collectively.

6 | LOCAL AND REGIONAL PARTNERSHIPS AND PROGRAMMES

SAEON Arid Lands Node recently launched a research project through which they intend to characterise ephemeral pans in the Northern Cape Province by using remote sensing and in-situ sampling protocols so as to establish a long-term monitoring framework. By studying the biodiversity of pans and their structure and functioning, it will be possible to evaluate the significance of impacts and changes in these systems in relation to global and land use change.

This project will achieve ground-breaking research into the scant knowledge pool regarding ephemeral pans of the Northern Cape. It will allow SAEON to provide much-needed information to land managers and decision makers on the management and conservation of these pans. It will also enable SAEON to detect changes in these systems across the country's most arid region, considering the current rise of developments and in light of global climate change. Although the core study site is situated in the Karoo,

a conveniently located pan in the Benfontein Nature Reserve near Kimberly, which has a international research station situated alongside, will be used as a test ground for methods and to gather data more frequently than in the remote, more arid, main study area.

SAEON further endeavours to incorporate "wetland biodiversity and conservation" as a topic in their Education Outreach Programme. This programme seeks to attract, expose and encourage grade 9-11 learners to pursue science careers at higher education institutions. By interacting with scientists and researchers, learners get a hands-on experience of research in environmental monitoring and observation. SAEON takes learners and educators on outdoors, "hands-on" experiences in a few fun filled days at camps and workshops, where they are equipped with necessary skills.



FIGURE 27: Anton Listrom teaching the LAB: Wetlands SA Project team, including Frances Beard, about the value of wetlands at the Craigy Burn Wetland site.

7 | COMMUNICATION AND PUBLIC AWARENESS

Communication, education and public awareness (CEPA) play an essential role in gaining the cooperation and collaboration of individuals and organizations in the public, political and economic sectors to act to reduce wetland loss and degradation. This section

details the current known activities being undertaken within Frances Baard District Municipality by various stakeholders to raising awareness and educate the community at large on the value of wetlands.

7.1 COMMUNICATION AND EDUCATION

At this stage, there are currently no community education or awareness campaigns to increase knowledge of the value of biodiversity or wetlands being undertaken by Frances Baard District Municipality itself. Although both the district and local municipalities conduct holistic environmental

management education and awareness workshops, wetlands are not solely focused on. There is potential however to start engaging relevant stakeholders around the importance of wetlands and the conservation and protection of the FBDM wetland ecosystems in particular.

7.2 PUBLIC PARTICIPATION AND AWARENESS

Strategic documents such as the IDP, SDF and EMF are reviewed and updated regularly. Formal public participation processes are followed whenever these documents are updated to ensure that the public has ample opportunity to submit comments and engage with the municipality. Frances Baard District Municipality is also responsible for commenting on all Environmental Impact Assessment (EIA) applications, the process of which requires two rounds of public participation, before a decision is made by either DENC or the National DEA.



FIGURE 28: LAB Wetlands SA project municipal delegates including FBDM receiving Google Earth training at the 2016 National Wetlands Indaba.

CONCLUSION

The aim of the Frances Baard District Municipality Wetland Report was to bring together all the available wetland related information for the municipality as well as highlight gaps where wetland management within the municipality could be strengthened moving forward.

Through an extensive desktop study, as well as multiple bi-lateral meetings with stakeholders working throughout Frances Baard District Municipality, it was found that the district has a substantial number of important and significant wetlands. The wetlands within the municipality not only provide a wide range of ecosystem services including flood attenuation, water storage, water filtration and food provision but also provide key habitat for a number of rare and critically endangered flora and fauna. They also play a pivotal role in reducing the impacts of climate change as well as in disaster risk management within the district.

The wetlands within Frances Baard District Municipality however, are currently under threat from deliberate draining of wetlands to make way for development and agriculture, inappropriate development within the close proximity to the wetlands, poorly regulated agricultural practices, contamination through chemical, sewage, effluent and stormwater seeps, and water abstraction. This puts the municipality at risk from losing the valuable ecosystem services the wetlands provide.

In terms of wetland management, based on the information available at the time, it was found that currently there is no dedicated department within Frances Baard District Municipality which directly deals specifically with the management of wetlands within the landscape. Instead, the management of wetlands is a collective but disconnected effort between the various stakeholders. It was also found that different

stakeholders are responsible for different sections of land and that the district and local municipalities currently work from separate IDPs with different goals. As a result of all this, management of wetlands is extremely fragmented across Frances Baard District Municipality and is not holistic or consistent. This puts wetlands at risk from degradation (whether deliberate or accidental) as well as from total loss.

It was also found that other than the SANBI BGIS NFEPA map, there is currently no formal ground-truthed wetland map for the district, clearly depicting where the wetlands are located within the landscape. This significant gap in mapping makes development planning around wetlands extremely challenging. As such, there is a real need for comprehensive ground-truthed mapping, which not only highlights where wetlands are on the ground but also indicates their status (i.e. pristine condition or degraded), to be undertaken within the municipality to assist town planners and farmers with future planning of developments and farm expansion/redevelopment.

Overall, in order to strengthen wetland management, prevent further loss of and/damage to wetlands and ensure the continued provision of valuable ecosystem services to the municipality, a holistic and collaborative management approach is recommended. It would be useful if FBDM developed a wetland management guideline strategy which could then be adopted and utilised by all the local municipalities. Re-establishing the forums such as the NC/FSWF would facilitate better sharing of information, addressing of capacity constraints and allocation of tasks for identified wetland maintenance/rehabilitation actions going forward. It would also be useful to work more closely with key external stakeholders such as SANBI, SAEON etc. to ensure cohesion between projects across the district.

DEFINITIONS

Biodiversity²⁶

The variability among living organisms from all sources, including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.

Climate Change²⁷

Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

Critically Biodiversity Areas²⁸

CBAs incorporate: (i) areas that need to be safeguarded in order to meet national biodiversity thresholds (ii) areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or (iii) important locations for biodiversity features or rare species.

Disaster²⁹

Disaster means a progressive or sudden, widespread or localised, natural or human-caused occurrence which is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Disaster Management

Disaster Management means the systematic process of using administrative directives, organisations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster. This term is an extension of the more general term 'Risk Management' to address the specific issue of disaster risks. Disaster Management aims to avoid, lessen or transfer the adverse effects of hazards through activities and measures for prevention, mitigation and preparedness.

Ecological Support Areas³⁰

ESAs are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature, e.g. the riparian habitat surrounding and supporting aquatic Critical Biodiversity Areas.

Ecosystem services

This is the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth.

DEFINITIONS

Estuary³¹

Means a body of surface water –

- (a) that is part of a water course that is permanently or periodically open to the sea;
- (b) in which a rise and fall of the water level as a result of the tides is measurable at spring tides when the water course is open to the sea; or
- (c) in respect of which the salinity is measurably higher as a result of the influence of the sea.

Flood³¹

A flood is defined as the temporary inundation of normally dry land areas resulting from the overflowing of the natural or artificial confines of a river or other body of water, including groundwater.

Flash Flood³¹

Flash floods are caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through river beds, urban streets, or mountain canyons sweeping everything before them. They can occur within minutes or a few hours of excessive rainfall. They can also occur even if no rain has fallen, for instance after a levee or dam has failed, or after a sudden release of water by a debris or ice jam.⁴¹ The basic cause of most river floods is excessive rainfall which causes significant elevations in river levels. The effect of elevated water levels is the inundation of low lying river floodplain areas.

Invasive Species

Means species that have been introduced into an area, and are able to outcompete and displace indigenous or useful alien species.

Ramsar Site³²

Ramsar Sites are designated because they meet the criteria for identifying Wetlands of International Importance. The first criterion refers to Sites containing representative, rare or unique wetland types, and the other eight cover Sites of international importance for conserving biological diversity. These criteria emphasize the importance the Convention places on sustaining biodiversity.

Wetland³³

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.

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