

Chapter 3

Background on the Eastern Basin and the Blesbokspruit



Abstract This chapter provides background on the eastern basin with special focus on the significance of the Blesbokspruit. It describes the East Rand in the Gauteng Province. The intricate nature of the Blesbokspruit is presented and how dependent various stakeholders who reside or work in the eastern basin are on this watercourse. The Blesbokspruit wetland was named a Ramsar site in 1986 and it underwent extensive transformation due to industrial development over the years and the resultant ecological damage, which led to it being placed on the Montreux Record. The chapter then sets out the non-statutory bodies contributing to the governance of the Blesbokspruit by explaining the role of the Blesbokspruit Forum and Blesbokspruit Trust, which include members of various spheres of government that are responsible for managing the Blesbokspruit. A brief section on the research methodology is included.

Keywords East Rand · Eastern basin · Blesbokspruit wetland

3.1 Introduction

This chapter provides background on the eastern basin with a special focus on the significance of the Blesbokspruit. It begins by describing the East Rand in the Gauteng Province. The East Rand was known for its abundance of mineral resources and had become highly lucrative since the 1940s, which brought many people to the area. However, the many profitable years of mining had a detrimental role on the environment of the eastern basin and specifically the Blesbokspruit. The intricate nature of the Blesbokspruit is presented as well as how dependent various stakeholders who reside or work in the eastern basin are on this watercourse. The Blesbokspruit wetland was named Ramsar site in 1986, and it underwent an extensive transformation due to industrial development over the years and the resultant ecological damage, which led to it being placed on the Montreux Record (explained in Sect. 3.4). The chapter then sets out the non-statutory bodies contributing to the governance of the Blesbokspruit by explaining the role of the Blesbokspruit Forum

and Blesbokspuit Trust, which include members of various spheres of government that are responsible for managing the Blesbokspuit. A brief section on the research methodology is included.

3.2 The East Rand

The wider Witwatersrand, of which the East Rand forms part, is the most densely populated region in South Africa. This area has a Highveld summer rainfall that occurs between November and April, with the average annual rainfall varying between 650 mm and 950 mm (Hawley and Desmet 2020, p. 10). The East Rand is prone to extremely low temperatures during the winter season but has hot summers. The East Rand (Fig. 3.1) includes the towns of Boksburg, Brakpan, Benoni, Springs and Nigel, which all fall within the jurisdiction of the City of Ekurhuleni (CoE) in the Gauteng Province (Digby Wells Environmental 2015, p. ii). This book is mostly centred on Springs, where the eastern basin acid mine drainage (AMD) treatment plant is situated. The CoE covers an area of approximately 1975 km² (Hawley and Desmet 2020, p. 1), and the surface water in the CoE is made up of several dams (e.g. Cowles and Nigel dams) and streams, which include the Blesbokspuit.

Many of the towns on the East Rand, such as Springs, came into existence through mining activities. Some of the black townships in the CoE, such as Daveyton, Kwa-Thema, Duduza and Tsakane, were established to create a residence for the mineworkers (Labuschagne 2015, p. 11). The increased number of people residing in the area is due to the employment opportunities that mining created. However, this also led to social risks such as the insufficient supply of clean drinking water and safe sanitation. It sounds contradictory that Ekurhuleni, translated as a ‘Place of Peace’,¹ has environmental problems that mostly stemmed from people’s excessive need for, and use of, water.

The East Rand is home to numerous important agricultural areas scattered across the region, and agriculture is known as the sector that requires the largest volumes of water (Environomics 2014, p. 18). The largest use of land (Fig. 3.2) is in the built-up urban group, accounting for 37%, cultivation agriculture covering 14% of the CoE, and mining accounts for 3% of land use (Hawley and Desmet 2020, pp. 20–21). Owing to growing business, the East Rand is described as a sanctuary for agricultural and mining activities and is proven to be unequivocal in the development and economic growth of South Africa. The East Rand is largely modified by urban, mining and agricultural development, and the CoE still supports threatened biodiversity and important ecological infrastructure within the grassland biome, which offers a variety of ecosystem services (Hawley and Desmet 2020, p. 1). Historical mining activity created a few lakes on the East Rand – such as Benoni, Boksburg and Germiston – which were used to supply the mines with water, before the Vaal Dam

¹The Tsonga word ‘Ekurhuleni’ means ‘Place of Peace’ (South African Cities Network 2019).

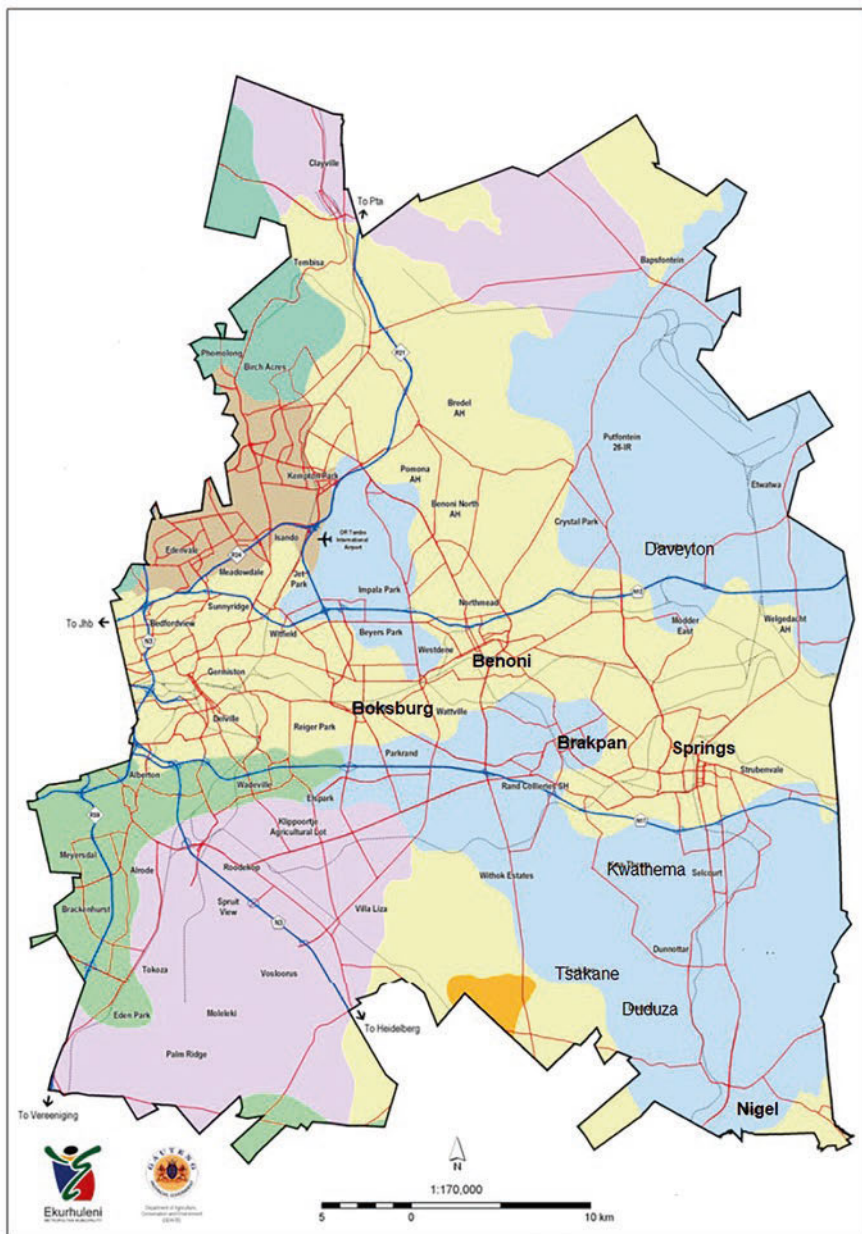


Fig. 3.1 Map of the East Rand. (EMM 2007b, p. 7)

was developed, and these lakes now serve recreational purposes (Labuschagne 2015, p. 1). These surface water areas act as sanctuaries to a substantial amount of South Africa's biodiversity and are threatened by grassland biomes (Labuschagne

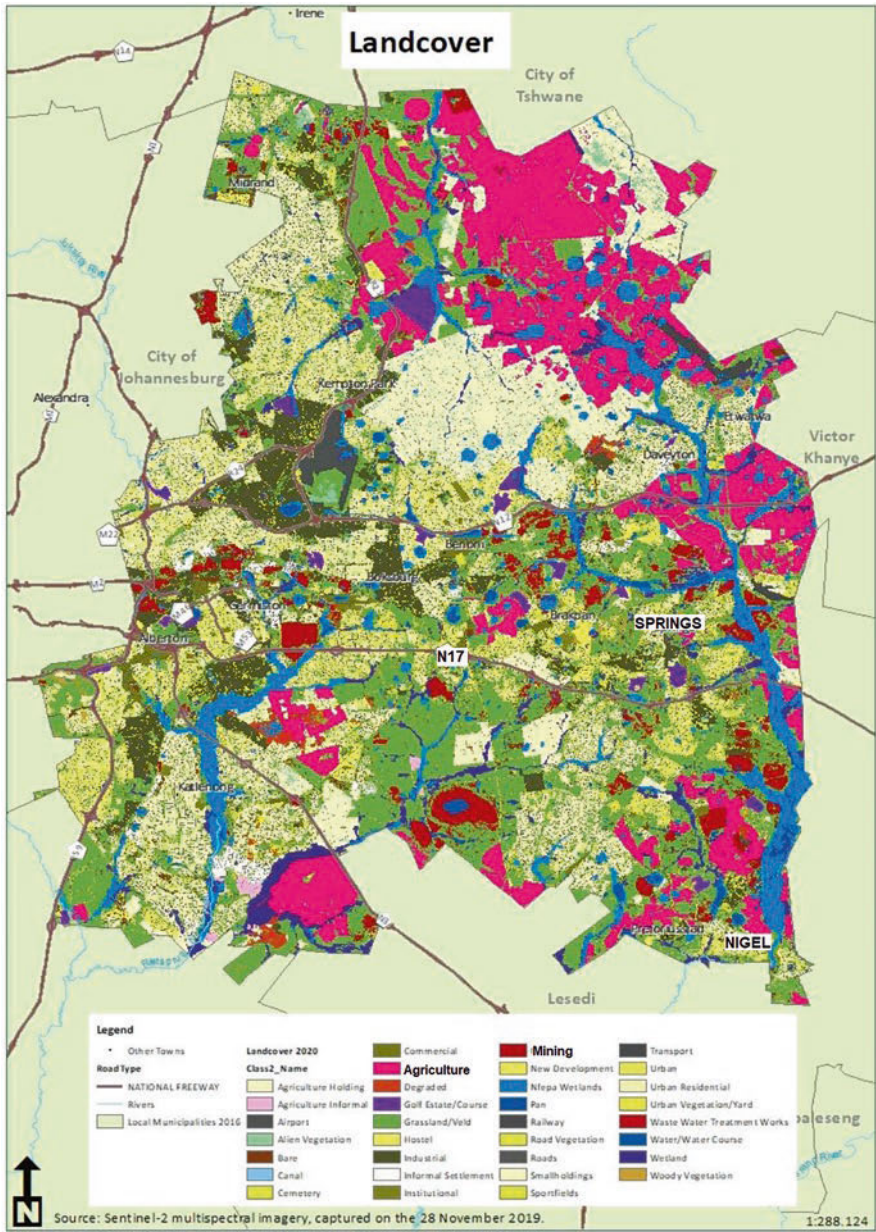


Fig. 3.2 Land use on the East Rand. (Hawley and Desmet 2020, p. 22)

2015, p. 1). However, because of the substantial degree of alteration of the natural landscape, most of the remaining ecosystems on the East Rand are threatened. These threats arise from the fact that the various uses of water for human purposes,

such as agriculture, industry or for urban use, exceed the amount of renewable water available (Molle et al. 2007, p. 585). Molle et al. (2007, p. 585) suggest that this leads to over-commitment of the water resource due to users not accounting for environmental water requirements, lack of hydrological knowledge, uncertain water rights or poor governance, resulting in more water being used than the system (environment) can allow.

Labuschagne (2015, p. 1) notes that South Africa is known as a treasure house due to its valuable minerals. Its comparative advantage in terms of mineral endowment has not translated into an economic competitive advantage due to numerous challenges facing the mining industry. The industry is continually working on addressing these challenges to maintain and reserve its space in the global market, while addressing national and community needs (Neingo and Tholana 2016, p. 283). However, as illustrated in Fig. 3.2, there is little available land around the Blesbokspruit system to accommodate new economic development, especially since there are a few areas that have little or no impact already on the East Rand. There is a “significant challenge to densify and redevelop existing built-up areas, as well as old mining and other land that is no longer used optimally” (EMM 2007a, p. 5).

For the sake of clarity, it is important to explain the terminology used in this book, and therefore to distinguish between the East Rand, the eastern basin, the Blesbokspruit Wetland and the Blesbokspruit catchment. The East Rand is a group of towns, which fall under the CoE’s jurisdiction. The East Rand can be differentiated from the eastern basin (see Fig. 3.3); a *basin* refers specifically to a river

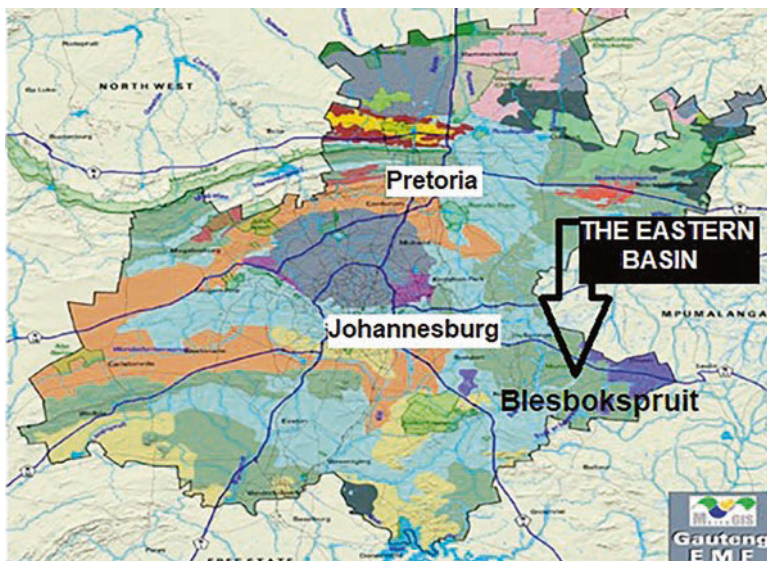


Fig. 3.3 Location of the Blesbokspruit and the eastern basin in the Gauteng Province. (Environomics 2014, p. 11)

drainage system, an area of land drained by a river or its tributaries (Milwaukee Riverkeeper 2015). Mining resources were found in this basin. Thus, mining overlaps with the geographical area, indicating that there can be residential areas situated where mining activity is taking place, as in the case of the eastern basin.

The Blesbokspruit catchment forms part of the eastern basin, which is on the East Rand, within the Upper Vaal Water Management Area, which is one of the water management areas that have been identified in the National Water Resource Strategy of South Africa (du Plessis et al. 2014, p. 2950). The Blesbokspruit catchment (see Fig. 3.4) drains an area of almost 1000 km² and functions within the Vaal

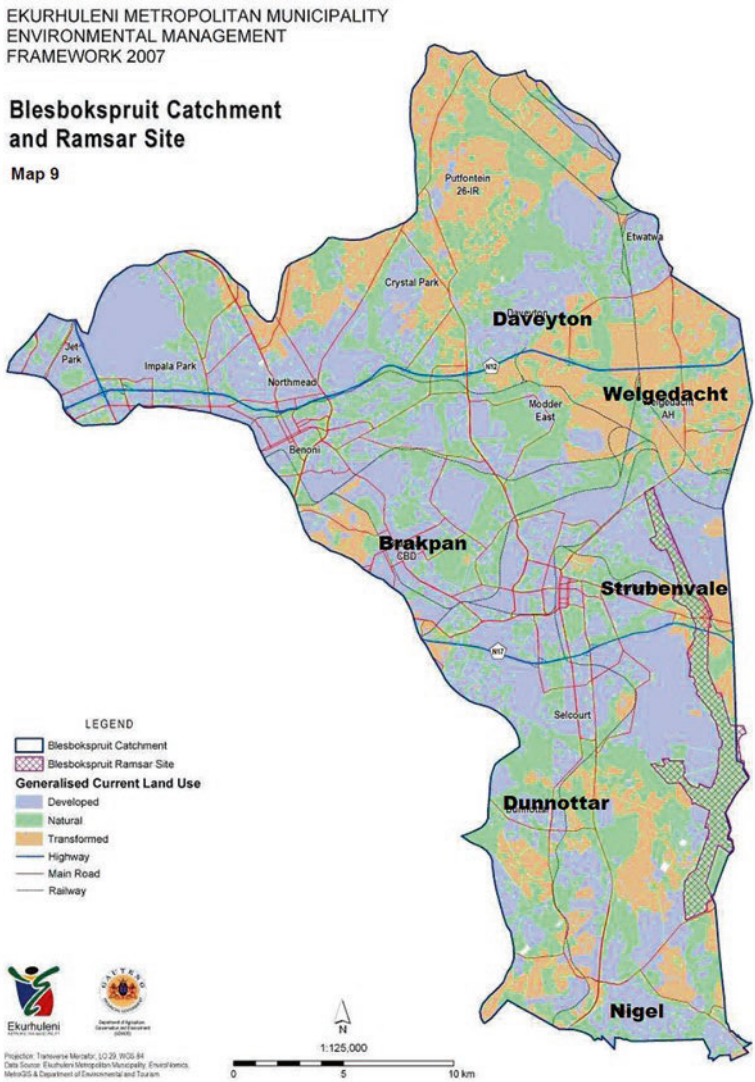


Fig. 3.4 Blesbokspruit catchment. ((EMM 2007b, p. 18).

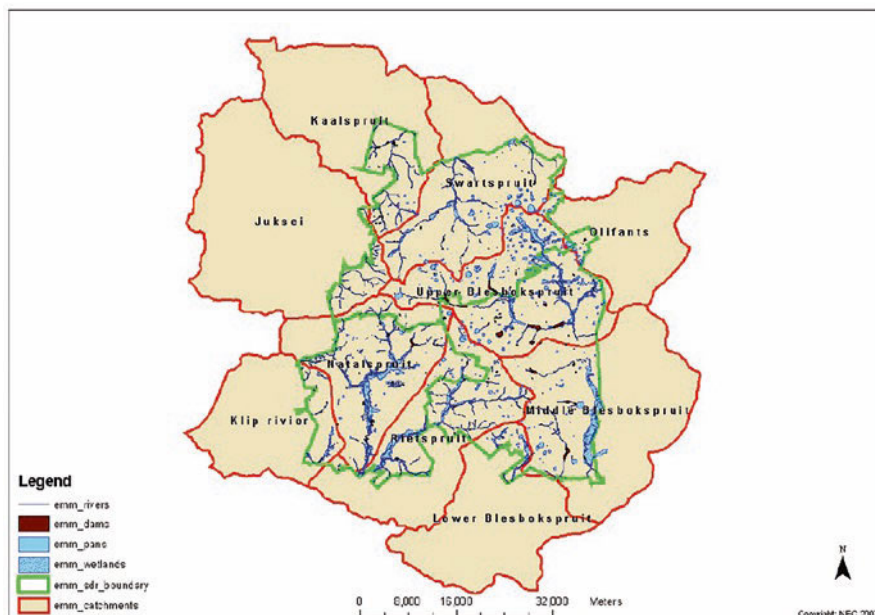


Fig. 3.5 Catchment management areas in the City of Ekurhuleni. (EMM 2007b, p.14)

Barrage and Vaal Dam catchments of the Upper Vaal Water Management Area. The Blesbokspruit (see Fig. 3.5) is managed by a catchment management agency, which aims to achieve effective communication with all stakeholders in the water management area to formulate and implement a catchment management strategy. Catchment management is achieved through the Blesbokspruit Forum (discussed in Sect. 3.5.1) (Blesbokspruit Forum Charter 2003, p. 2; RSA 1998). The Blesbokspruit is the watercourse that is the focus of this book. For the purpose of the book, the eastern basin is referred to because of the relevance of mining and its impact on the water quality of the Blesbokspruit. Depending on the context, the term Blesbokspruit catchment is used when referring to the management of the water, and the term Blesbokspruit wetland or river is used when referring to the uses of the water.

3.3 The Eastern Basin

The *eastern basin* – also referred to as the East Rand basin (see Fig. 3.6) – refers to the mining-related areas to the east of Johannesburg, and the term is used in the context of dealing with AMD on the Witwatersrand. This terminology is based on the three underground mining basins, namely (1) eastern, (2) western and (3) central established on the Witwatersrand after the discovery of gold in 1886 (Adler et al. 2007, p. 34). The discovery of gold is attributed to George Walker and George

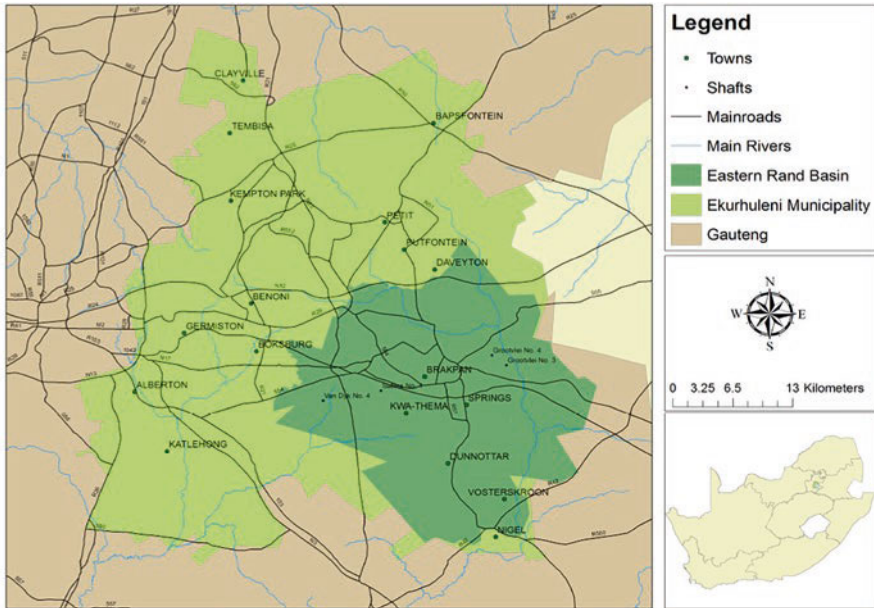


Fig. 3.6 The eastern basin in the Gauteng Province. (Labuschagne 2015, p. 2)

Harrison. They identified “surface outcrops of gold-rich conglomerate on old farmland”, called *Langlaagte*, near the centre of Johannesburg (Kirk et al. 2004, p. 534). After this discovery, the “outcrop of the Main Reef Group, which hosts the most important gold-bearing conglomerate reefs of the Witwatersrand, was soon traced along the Central Rand for some 40 kilometers (km), from the Durban Roodepoort Deep mine in the west to the East Rand Proprietary Mines in the east” (Tucker et al. 2016, p. 106). This is how gold in the west, east and central basins were discovered. The Witwatersrand basin is known as the largest goldfield in the world, having produced half of the gold ever mined (Kirk et al. 2004, p. 534); in total over 52,000 t of gold, with approximately 30,000 t still available to mine (Tucker et al. 2016, p. 106; Hartnady 2009, p. 328). Partly owing to gold-mining activities on the Witwatersrand, including the East Rand, in 2009 South Africa dominated the world as the number 1 gold producer, indicating the extent of mining that took place. South Africa is currently the fifth largest producer of gold, with China, Australia, Russia and the United States having overtaken the country’s position (Neingo and Tholana 2016, p. 283).

The eastern basin is about 30 km long and 20 km wide and has a mine lease area that extends for 768 km² (Fig. 3.7) (Labuschagne 2015, p. 1). Gold mining has occurred in the eastern basin since the discovery of gold in 1886 and reached its peak in the 1940s and 1950s. In 1955, there were 24 gold mines and 90 shafts existed, but due to the fixed gold price and high working costs, there were several mine closures between 1950 and 1960, with mines being made inactive, waiting for closure certificates or completely abandoned (Labuschagne 2015, p. 12; Scott 1995, p. 19). Extensive coal mining in the eastern basin also took place. Coal mines began

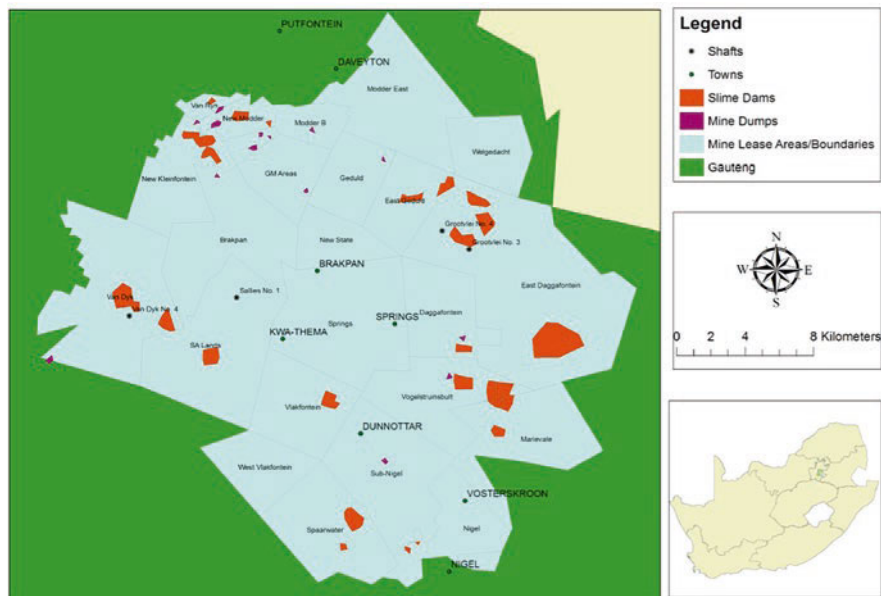


Fig. 3.7 Eastern basin mine lease areas. (Labuschagne 2015)

operating from the early 1890s and ended in the late 1940s. However, the economic resource potential still existed in the area, which led to active mining for many more years. As a result, even though most gold mining in this basin had already reached its lifespan and began to decline, during its peak it had 28 mines and produced about 10,000 tons of gold (Labuschagne 2015, p. 2). Thousands of people earned their living off mining during its predominant years, implying that “the mines of the Witwatersrand have shaped the economy of this country” (Scott 1995, p. 6) (see Fig. 3.8 for how widespread mines are across the Gauteng Province). However, by 2011 most of the mines were already closed, and damage caused began to surface increasingly (Ambani 2013, p. 88). The damage was due to “depth, geological complications and their primitive, poorly planned, beginnings” (Scott 1995, p.1). The mining industry had underestimated the potential life of the gold mines of the Witwatersrand (Tempelhoff et al. 2007, p. 107). Figure 3.9 illustrates the rate at which mining excelled and then declined in the eastern basin, as well as how many leading mining companies operated at a time.

Owing to the fact that mineral recovery is not a renewable process, once a mine reaches the end of viable economic production, the mine needs to be closed (Milaras et al. 2014, p. 1). Sustainable mine closure must be in place not to negatively impact the area that was mined so that the land can be used in future. This requires thorough and efficient management of mine closure, which creates “significant management problems” for governments, communities and mining companies (Milaras et al. 2014, p. 2). This implies that mining has a stark effect on the natural environment, making it impossible to measure the benefits versus the obstacles. Mining began

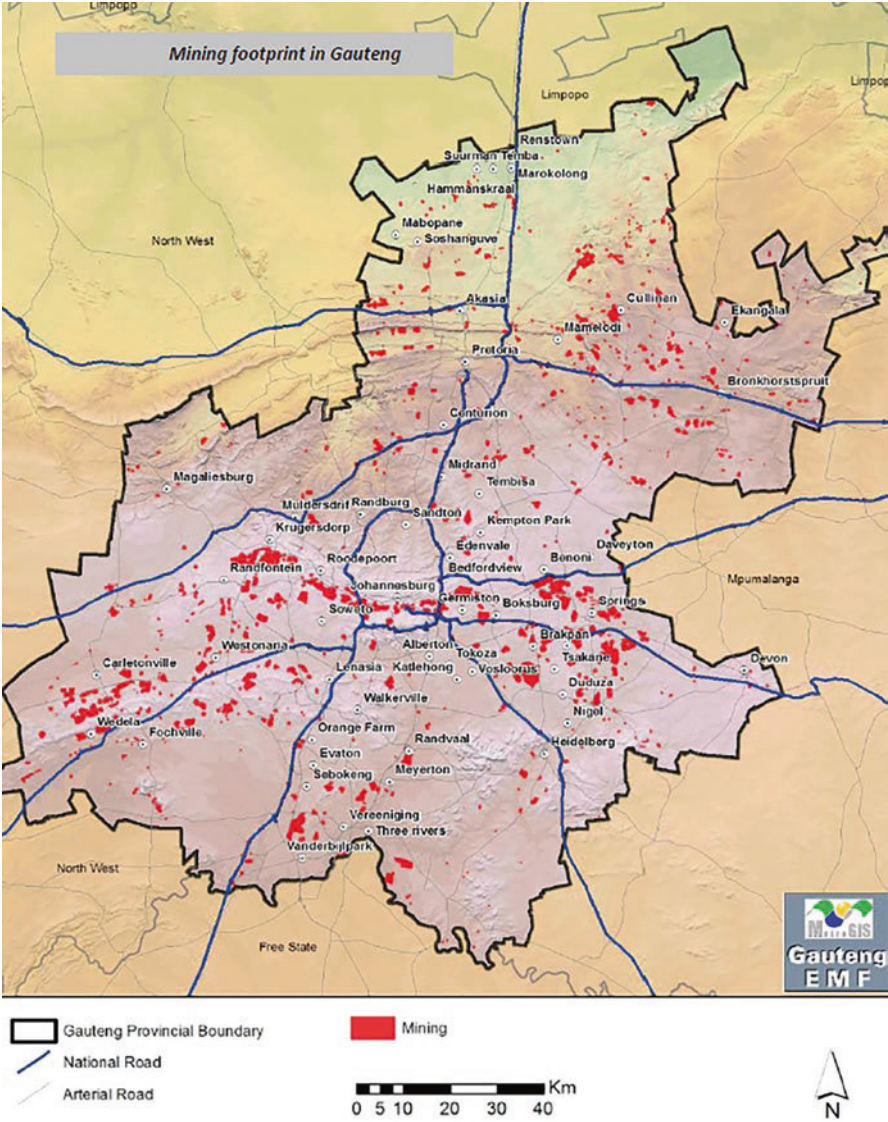


Fig. 3.8 Mining in Gauteng Province. (Environomics 2014, p. 50)

over a century ago, and its ongoing detrimental impact on the environment was possibly never anticipated when gold was discovered. Similarly, when gold was discovered, the process of extracting the resource had to be learnt, and during this process the impact it could pose to the environment was yet to be revealed. Therefore, ways to address the impact also had to be tried and tested. Consequently, the commencement of mining led to the discovery of mining’s destruction of the environment.

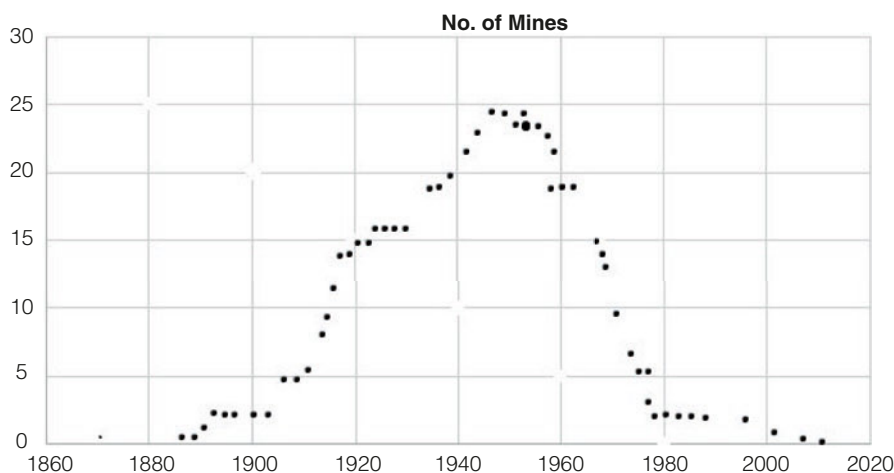


Fig. 3.9 Mining companies in the eastern basin since the late 1880s. (Adapted from Scott 1995, p. 27; Ambani 2013, pp. 87–88)

As gold mining developed on the East Rand, the underground operations became interlinked and fewer mines used dewatering (to remove excess water). Underground mining results in the collapse of the overlying rock strata, and when mining terminates, the voids in the fractured rock become filled with water and decanting occurs from the lowest opening. Further, opencast coal mining involves blasting and removal of the rocks overlying the coal layer, which is removed completely. Opencast coal mining is known to destroy the natural groundwater systems and severely alter the nature of groundwater and surface water interactions because decanting takes place almost a decade or more after mining ceases (Environomics 2014, p. 28).

Environmental problems stemmed from ongoing groundwater control, water resource contamination by acid mine drainage and other factors of pollution caused by illegal underground mining by Zama Zamas², “the glory days of South African gold mining appear to have arrived finally at a shameful end” (Hartnady 2009, p. 329). The commencement of environmental degradation associated with the formerly booming industry now posed a severe threat and is costing far more than the value of some of the gold ever mined (Hartnady 2009, p. 329). Further, coal is increasingly becoming available in the eastern basin and extensive coal mining operations occur (De Jager, personal interview, 2018; Madden, personal interview, 2018; Pillay, personal interview, 2018; Storey, personal interview and site visit, 2018; Van der Merwe, personal interview, 2018).

Coal mining is vital because through the process resources are obtained that cannot be produced through farming or cannot be made in a factory, such as electricity, which is imperative considering South Africa’s struggle with ongoing power cuts

²This is a term used in South Africa for an illegal miner.

due to demands for electricity (Creamer 2019a). Until alternative more sustainable energy sources can replace the need for coal mining, the coal industry is crucial for human sustainability, and vital for economic growth and social upliftment (Environomics 2014, p. 54). While this remains the case, enormous cost implications and damage to the environment occur. Coal mining activities include the creation of slimes dams, quarries, mine dumps and disturbed land (Labuschagne 2015, p. 10), and the continuous pumping to remove inflow water.

The aforementioned make it critical for new technology to be experimented with globally as part of an initiative to ensure mining is safer and more efficient. New initiatives for safer mining are jointly funded by the private and public sectors. Representatives are utilised to “provide longevity to the declining South African mining industry” (Creamer 2019b). The main aim is “to mark the end of mining’s fragmented past” and therefore to advance in safer, healthier and more efficient mining to take mining to a level for the benefit of the South African people (Creamer 2019b).

The Blesbokspruit experienced declining water quality over the years in which mining took place and more so when mining ceased in 2011, which implied that pumping of water had come to an end (discussed in Sect. 4.3). In addition, as the population grows, increasing volumes of water from wastewater treatment plants are discharged into the Blesbokspruit, further exacerbating an already sensitive system.

3.4 The Blesbokspruit and Its Wetland

The Blesbokspruit area of study includes Springs (see Figs. 3.10 and 3.11), where the AMD treatment plant is situated. Springs³ includes several residential areas, such as Strubenvale, Casseldale, Grootvaly Agricultural Holdings, Bakerton, Welgedacht and Aston Lake. The town of Nigel is downstream of the Blesbokspruit and community members from this town were also interviewed for this book.

There are 75,300 individuals and 23,700 households that fall within the Blesbokspruit area (Digby Wells Environmental 2015, p. 82). The potential economically active percentage of the population is 72%, and 6% are of retirement age. Of the households, 9% reside in rural areas, including farms and smallholdings, and 92% access water through municipal means or other water service providers. The majority of the area is considered established as most houses have been in existence for over 20 years (Digby Wells Environmental 2015, p. 83). The economic development in the area was discussed in Sect. 3.2.

The book identified stakeholders and key individuals who interact with the Blesbokspruit to explore how various social constructions of the water quality are formed, and why they differ. Stakeholders who interact with the Blesbokspruit

³This study refers to the Springs community unless otherwise stated.



Fig. 3.10 The Blesbokspruit. (Photographs by researcher)

include environmental activists, communities (mainly residential property owners from Springs and Nigel), researchers, government (local, provincial and national), industry (mining and wastewater treatment works), tourism (Marievale Bird Sanctuary, and wedding and conference venues) and commercial agriculture (including feedlots). The satellite image in Fig. 3.12 indicates where these stakeholders are situated in proximity to the Blesbokspruit and, therefore, users of the water. Residential areas are situated alongside the river and irrigation points are visible. Recreational activities along the Blesbokspruit happen at places such as the Stable Inn Lodge and Conference Venue, and the Riverside Country Estate wedding venue. Marievale Bird Sanctuary, the Suikerbosrand Nature Reserve and the Karan Beef Feedlot are situated further downstream. The eastern basin AMD treatment plant is situated upstream, on the Grootvlei Mine site. The AMD treatment plant discharges from 80 Mℓ up to 110 Mℓ of water per day into the Blesbokspruit. This created increased volumes of water flowing into the Blesbokspruit, which led to the flooding of the banks of property situated alongside the river.

The Blesbokspruit originates to the north of Benoni and Daveyton and flows southwards through Springs, Heidelberg and Nigel towards the Vaal River (EMM 2007a, p. 10; Springs Advertiser 2014a). Most of the Blesbokspruit catchment though falls within Nigel. Half of the Blesbokspruit wetland is protected by the Marievale Bird Sanctuary, and the other half is owned by the Anglo-American Group, due to being situated on land they own (Thorius 2004, p. 18). For clarity, the Grootvaly Wetland Reserve lies off Welgedacht Road and is a high-altitude wetland

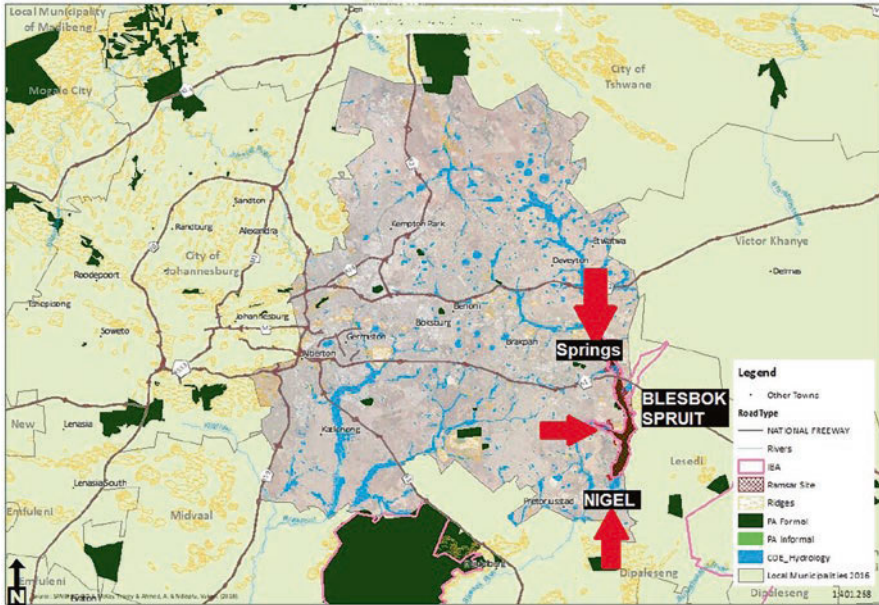


Fig. 3.11 Location of the research area. (Hawley and Desmet 2020, p. 24)

that runs along the Blesbokspruit River. The Grootvaly wetland lies to the north of the Blesbokspruit and at the southern end is the Marievale Bird Sanctuary; and these two form the Blesbokspruit Wetland Reserve (Ambani 2013, p. 63; South Africa Venues 2019). In this book, I refer to this as the Blesbokspruit wetland.

The Blesbokspruit wetland is one of the largest wetlands on the Highveld and was declared a Ramsar site in December 1986 (see Fig. 3.13), meaning it gained the status of international significance due to its unique ecosystem (Krige 2018; Madden, personal interview 2018). The Ramsar Convention⁴ on Wetlands of International Importance was agreed to in Iran as one of the first international environmental treaties to monitor wetland degradation, and therefore to protect these ecosystems as habitats for wildlife and birds (Ambani 2013, p. 17). Wetlands that are classified on this list are those requiring special attention due to their significant value.

The Blesbokspruit (see Fig. 3.14) is one of the most important river systems in Gauteng and forms part of the Vaal River Catchment, along with the Klip River and the Natal Spruit. The Blesbokspruit flows into the Suikerbos River where it then joins the Klip River (Labuschagne 2015, p. 8). The Blesbokspruit, covering an area of 1427 km², is one of two main streams in the East Rand, the Rietspruit (which is

⁴South Africa was one of the first signatories to the Ramsar Convention in 1975 (Ramsar website 2017).

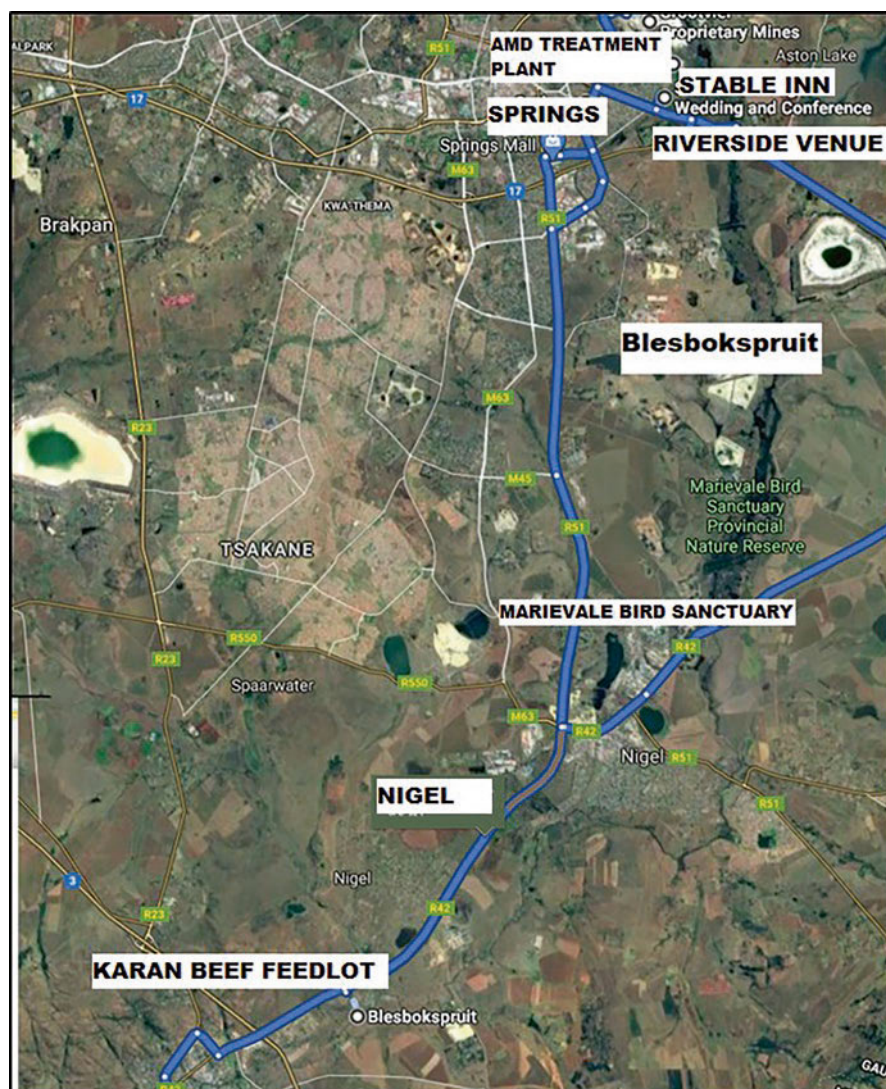


Fig. 3.12 Stakeholders who interact with the Blesbokspuit. (Google Maps 2020)

820 km²) being the other (Scott 1995, p. 16). It extends over 22 km between the R22 and R555 road routes and is about 7 kilometres wide (Springs Advertiser 2014a).

The Marievale Bird Sanctuary is situated within the upper reaches of the river. It is known as one of the most popular attractions in Gauteng and covers over 1000 ha of the Ramsar site (Gauteng Tourism Authority 2020; Madden, personal interview, 2018). According to Hawley and Desmet (2020, p. 19), its ecosystem provides protection for over 450 bird species, including water birds (Gauteng Tourism Authority 2020). Approximately 18 species are of conservation concern and are reliant on the

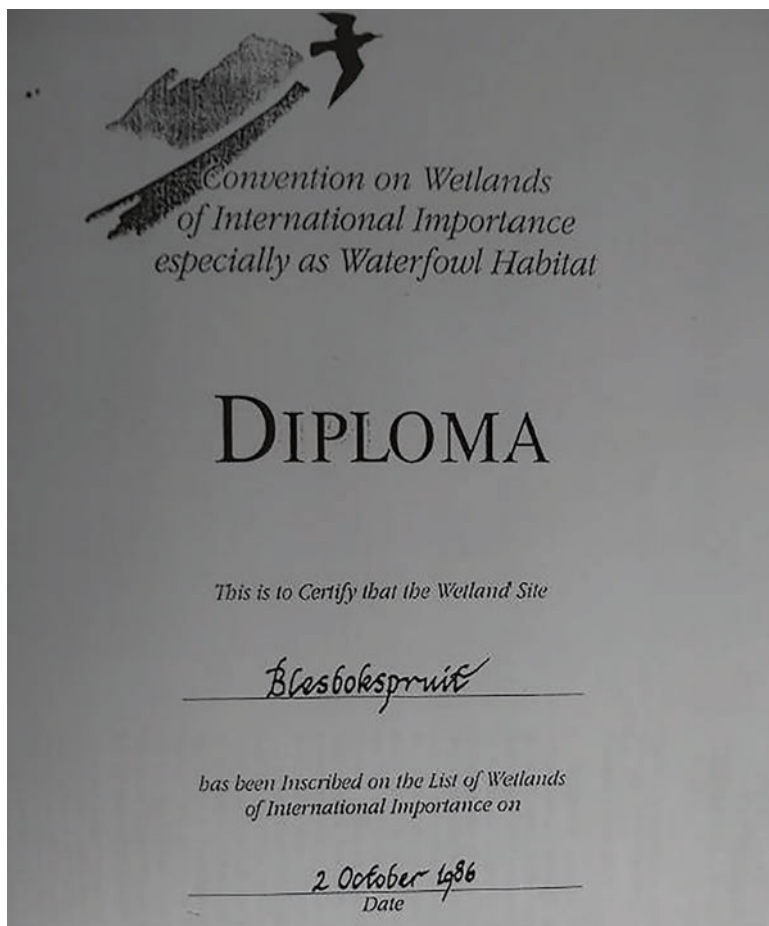


Fig. 3.13 Certificate indicating the recognition of the Blesbokspruit wetland as a Ramsar site. (Photograph by Stan Madden)

habitat in the CoE, 2 of these species are endangered, 9 are vulnerable as they are reliant on wetland habitats, and 7 are threatened (Hawley and Desmet 2020, p. 19). In 2016, 3082 birds were counted, according to the Coordinated Wetland Aquatic Count (Krige 2018). To the east of the wetland there are extensive natural wetlands, and the area to the west is highly developed by agriculture and human settlements, mines, waste disposal sites and wastewater treatment works, all impacting negatively on the quality of the water of the Blesbokspruit (EMM 2007a, p. 10). Further, most of the Blesbokspruit is filled with reeds, proven to be necessary for the system, as it absorbs chemicals and other substances from the water into their roots, and this cleans the water (Van der Merwe in Krige 2018). However, if not managed, reeds can halt the flow of water in certain parts of the river, causing excessive flooding.



Fig. 3.14 The Blesbokspruit wetland. (Photograph by Stan Madden)

Based on these human-induced changes, the Blesbokspruit is described as an artificial wetland that was created through mining (Blesbokspruit Trust representatives, personal communication, 2018; Govender, personal interview, 2018; Madden, personal interview, 2018). It developed into a permanent wetland because of the discharge of large quantities of water from underground gold mines in the early 1990s (Ambani 2013, p. 19). This means that the quantity of water in the Blesbokspruit is no longer dependent on the season but has water all-year-round. The Blesbokspruit has therefore been partially modified due to the impacts on the river and serves as a buffer for the water entering the Vaal River, the main source of water for Gauteng's socio-economic activities (Ambani and Annegarn 2015, p. 48). The Blesbokspruit wetland acts as a purifier of mining, industrial and wastewater treatment works discharges. The challenge is now for water management, especially in agriculture due to the importance of the sector for food security. Much stricter inspections by decision-makers and civil society of new infrastructure development in relatively open river basins are needed to avoid over-commitment of already limited water resources (Molle et al. 2007, p. 585). Water resources in the Blesbokspruit are fully committed to a variety of human uses. This implies that water quality is degraded, river-dependent ecosystems are endangered and increasing demand for water is leading to strong competition between users (Molle et al. 2007, p. 587).

Owing to the over-exertion on the system and its deteriorated state, in 1996 the Blesbokspruit wetland was placed on the Montreux Record. This is equivalent to a person being blacklisted for having unpaid debt (Ambani and Annegarn 2015, p. 1; *Spring Advertiser* 2014b). Environmental sites of international importance that experience serious ecological problems both for humans and wildlife are placed on

this record. It is “a register of wetland sites on the List of Wetlands of International Importance where changes in ecological conditions have occurred, are occurring, or are likely to occur as a result of technological developments, pollution or other human interference” (Ramsar website 2017). Despite numerous attempts to better the Blesbokspuit wetland, it remained on the Montreux Record throughout the duration of the research conducted for this book. Mashau (in Blesbokspuit Forum 2018d), a representative of the Gauteng Department of Agriculture and Rural Development (GDARD), explained that in order for the Blesbokspuit to be removed from the Montreux Record, it has to regain its Ramsar status and meet specific water quality guidelines. Mashau (in Blesbokspuit Forum 2019a, d) further reported that the paperwork to remove the Blesbokspuit from the record was complete and had been submitted to the Department of Environmental Affairs (DEA), who is responsible for submitting the paperwork to the National Ramsar Convention on behalf of GDARD. This was a positive attempt from the GDARD. However, by the end of the research period the DEA had still not submitted the documents to Ramsar.

3.5 Non-statutory Bodies Contributing to the Governance of the Blesbokspuit

This section introduces two non-statutory bodies in the management of the Blesbokspuit catchment. It is important to note that this section does not explain the direct roles of the various departments that are involved in managing the Blesbokspuit; this is explained in Chap. 7 (Sect. 7.3.1) to provide a detailed background on the roles and responsibilities of the various spheres of government with regard to the management of the Blesbokspuit, before delving into the issues of power relations between governing bodies and other stakeholders (which is the purpose of Chap. 7). This section specifically refers to the role of the Blesbokspuit Forum, which is attended by government departments that manage the Blesbokspuit catchment. They meet with interested parties, sectors and businesses that interact with the Blesbokspuit through their discharge of water or the abstraction of water. This forum is significant to the book because all stakeholders who interact with the Blesbokspuit are meant to attend this forum to report back to create an awareness of what takes place in the catchment, therefore, to enhance communication pertaining to the Blesbokspuit catchment. It is a public forum and is open to the community. The Blesbokspuit Trust is a non-governmental organisation (NGO); their contributing role to the catchment is explained below.

Members of the Blesbokspuit Wetland Forum, the Gauteng Wetland Forum and Blesbokspuit Trust served as significant sources of information for the research. The Blesbokspuit Forum (discussed further in Sect. 3.5.1) is a catchment forum where representatives of government departments present their water quality results according to a set of In-Stream Water Quality Guidelines, and organisations have to report on their water usage (Reservoir website 2020; Blesbokspuit Forum Charter

2003). A Department of Water and Sanitation (DWS) representative records the information and distributes the minutes of the meetings to the forum representatives. Meetings take place in Springs at the Grootvaly Educational Centre (Blesbokspuit Forum 2018a, b, c, d)⁵. The Gauteng Wetland Forum is a platform where relevant representatives of the various catchment forums in Gauteng meet to provide feedback on each catchment. The vision of the Gauteng Wetland Forum is to “effectively conserve and manage wetland ecosystems in the Gauteng Province” (Wetlands Portal of South Africa 2016). Meetings take place at the Endangered Wildlife Trust venue in Modderfontein (Gauteng Wetland Forum 2018a, b, c). These meetings allowed for sound interaction with various individuals among the stakeholders (Fig. 3.15). The Blesbokspuit Trust (discussed further in Sect. 3.5.2) consists of several members who are residents in the area. They have a vested interest in protecting the Blesbokspuit Ramsar site because they reside in the area. The Trust consists of 10–12 members (five of whom were interviewed) who meet on a monthly basis to discuss the welfare of the area and address issues pertaining to the Blesbokspuit. For instance, the excessive reeds and hyacinth growth halt the flow



Fig. 3.15 Members of the Gauteng Wetland Forum during a tour of Marievale Bird Sanctuary led by Stan Madden. (Photographs by researcher)

⁵ During the Covid-19 global pandemic, all forum meetings took place online via Zoom.

of the Blesbokspruit; therefore, maintenance of the reeds needs to take place (Naidoo, personal interview, 2018).

3.5.1 *The Blesbokspruit Forum*

The following information is taken from the Blesbokspruit Forum Charter (2003, p. 2). The Blesbokspruit Forum was established in 1996, and since the adoption of the National Water Act (NWA) in 1998, its intention was to promote the aims of the NWA. The Forum's mission is "to provide a platform to assist in the development of an integrated environmental management strategy for the Blesbokspruit catchment through stakeholder participation". The Blesbokspruit Forum is a body that meets on a quarterly basis, providing an opportunity for all role-players to participate on a platform that is transparent to discuss the issues within the Blesbokspruit catchment. Therefore, "the participation of all people in the protection, use, development, conservation, management and control of the water resources of the Blesbokspruit catchment" is promoted through this forum (Blesbokspruit Forum Charter 2003, p. 2–3). It serves as the biggest communication link between the spheres of government related to the Blesbokspruit (Maurizi, personal interview, 2018). Water use licences, environmental authorisations and mining rights are presented and discussed in the forum. The aim is for all information pertaining to the management of the catchment to be made available to stakeholders. It is therefore a body that "has the capacity to make recommendations to the authorities and other forum management structures [such as the Gauteng Wetland Forum] on behalf of the broader body of Forum members". However, this Forum, according to its charter, cannot be considered a pressure group, an activist body or one that can dictate actions to participants (Blesbokspruit Forum Charter 2003, p. 2–3). The Forum consists of government departments concerned (i.e. national, local and provincial), mines, industries, farmers, local authorities, NGOs, water service providers and the general public. Considering that this forum brings together stakeholders that contribute and have a role in managing the Blesbokspruit catchment, this is a platform where communication is transferred; therefore, the information about the Blesbokspruit and the water quality is presented on this platform. If a stakeholder or public individual is not aware of why a water use licence, for instance, was issued, they could question the relevant authority at a forum meeting or through the e-mailing group.

Through observation and attendance of forum meetings since 2018, it was found that the Blesbokspruit Forum is chaired⁶ by the DWS and is made up of representatives of 18 organisations, including mining companies, industry and the agricultural sector, and government units. Local government includes the CoE and Lesedi Local Municipality, provincial government includes GDARD and national government

⁶Rand Water assisted in chairing forum meetings since 2020, once they were held virtually.

includes the Department of Mineral Resources (DMR) and the DWS. Five units within or under the DWS are represented, which are the Trans-Caledon Tunnel Authority (TCTA), Compliance Monitoring and Enforcement (CME), Catchment Management Agencies, Water Services Regulation and Water Use Licences. Lastly, two NGO representatives of the Gauteng Wetland Forum and the Blesbokspruit Trust are also typically present (Blesbokspruit Forum 2018a, b, c, d, 2019a, b, c, d). Six water quality reports are normally presented at forum meetings by the DWS, the CoE, the Ekurhuleni Water Care Company (ERWAT), Lesedi Local Municipality, Rand Water⁷ and the TCTA. The forum is open to public attendance, and influential members of the community attend to raise issues on behalf of the community. From a government point of view, this is considered part of the public participation process for environmental conservation. As of 2020 points were allocated to those who participate in the forum, by the South Africa National Accreditation System, each representative is able to obtain two points a year (half a point allocated for attending the four meetings per year). This is significant to those who are involved in managing the Blesbokspruit to indicate their attendance and contribution to the forum. Further, those representatives who do not usually attend forum meetings might be more inclined to attend as a result.

Numerous presentations typically take place in the forum, such as new environmental authorisation processes, new mining applications, water use licence status in the catchment, environmental conservation and wetland protection. Further, pollution incidents are a permanent agenda item for raising current or new incidents. Details of the Blesbokspruit Forum, such as the minutes and water quality reports, are placed on the Reservoir website, which is administered by Rand Water on behalf of the DWS (Blesbokspruit Forum 2018a). At the beginning of 2019, a Google e-mailing group was created to ensure that the transfer of information outside forum meetings reached all stakeholders involved in the Blesbokspruit catchment. This platform allows stakeholders to raise issues before and after meetings (Blesbokspruit Forum 2018d).

This forum was therefore crucial to the research because it served as the most important platform where communication between stakeholders took place. Those who attended forum meetings were also able to share the information with other stakeholders and therefore contributed significantly as a factor (the transfer of information and communication) that influenced key individuals' and stakeholders' social constructions of the water quality of the Blesbokspruit (discussed in Chap. 6).

3.5.2 *The Blesbokspruit Trust*

Members who live in Springs (see Fig. 3.16) and who were interested in environmental conservation formed the Trust as a registered NGO in 1998 (Madden, personal interview, 2018). At the time that this research was conducted, Charl van der Merwe served as the chairperson of the Trust (Blesbokspruit Forum 2019a). The

⁷Rand Water is the bulk water provider in the Gauteng Province and surrounding provinces.



Fig. 3.16 Blesbokspruit Trust members (from left to right: Ewald Meyer, Charl van der Merwe and Stan Madden). (Photograph by researcher)

main aim of the Trust is for its voluntary members to contribute to reducing pollution impacts on the Blesbokspruit by reporting these incidents to the appropriate government department. Often, residential property owners contact the Trust regarding pollution incidents and they contact the municipality to ensure that the problem is attended to (Van der Merwe, personal interview, 2018). Members of the Trust live in residential areas adjacent to the Blesbokspruit, and they have a vested interest in issues pertaining to the river. The Trust assists with reviewing environmental impact assessments (EIA) and attending stakeholder meetings regarding new mining applications, as well as being part of the Blesbokspruit Forum and Gauteng Wetland Forum.

Members of the Trust meet monthly, and they function similarly to an NGO. Initially, the Trust was made up of residential property owners some of whom were also representatives of corporate companies, such as the SAPPI Enstra Mill, Impala Platinum, Grootvlei Mine and Zincor Operation, and government officials. Residential property owners who are members of the Trust got their respective companies involved because this contributed to their livelihood and benefitted these companies by conserving the environment. Some of these corporate companies sponsored the Trust (such as Zincor) via monthly financial contributions over a period of 10 years (Van der Merwe, personal interview, 2018). The Trust relies on sponsors and donations to operate, which has declined over the years (Naidoo, personal interview, 2018). The Trust was financially sound when it began but is currently struggling to maintain its sponsors. Anglo American is one of the companies that no longer sponsors the Trust, and by 2018 there were severe financial

constraints (Naidoo, personal interview, 2018). While Carnival City⁸ is the biggest funder and Impala Platinum also continues to fund the trust (Naidoo, personal interview, 2018), it is a struggle to secure sufficient finances. Many members are leaving the Trust due to the closure of mines, which places financial strain on companies. The corporate companies that still serve as members are not in a financial position to provide ongoing financial assistance (De Jager, personal interview, 2018). According to Pravin Naidoo, who is a member of the Trust and a Springs resident and manager at Impala Platinum, Impala is an ongoing sponsor of the Trust. All the sponsored money goes towards environmental conservation.

An environmental education centre, called the *Grootvaly Educational Centre*, was built through the CoE, with the assistance of many sponsors, such as Impala Platinum⁹. The Trust runs this centre, built to train children, especially the underprivileged, in environmental conservation (Naidoo, personal interview, 2018). Busloads of schoolchildren were taught at the centre once a week, through funds made available by Anglo American (Madden, personal interview, 2018). In 2017, it educated 1411 children, but owing to the high transport costs involved in bringing children to the centre, the number of children has reduced over the years (Van der Merwe, personal interview, 2018). The Trust also consistently tries to make many people aware of what they do (De Jager, personal interview, 2018; Naidoo, personal interview, 2018).

3.6 Research Methodology

The Blesbokspruit was used as the case study for the research conducted for this book. A case study was used to explore the views of various key individuals and other stakeholders who interacted with the Blesbokspruit due to their need for water and based on their need for water, how they socially constructed the quality of the water. A case study was the most suitable approach for this research to identify stakeholders' perceptions of AMD treatment in the eastern basin, and how and why various social constructions of the water quality of the Blesbokspruit were formed due to vested interests, which resulted from power relations.

Owing to the in-depth nature of the research, a qualitative research design was used to obtain both primary and secondary data. The book therefore uses a qualitative research design to explain how water quality in the Blesbokspruit is socially constructed in the context of AMD and its treatment.

⁸Carnival City is a hotel and casino situated in the East Rand.

⁹According to Naidoo (personal interview, 2018), Impala is passionate about the environment and spent close to a billion rand over the last 20 years to assist with environmental conservation in the area.

3.6.1 Data Collection

The data collection included a combination of primary and secondary data. Data were collected in two phases during the research which stretched from January 2018 to August 2020. The first phase involved identifying the various stakeholders who interact with the Blesbokspruit and the key individuals within stakeholders who were linked to AMD treatment. The second phase involved conducting in-depth interviews, attending the Blesbokspruit Forum and the Gauteng Wetland Forum, and site visits.

Primary data included scoping interviews, face-to-face in-depth interviews with key individuals, attendance of Blesbokspruit Forum meetings (since 2018), attendance of Gauteng Wetland Forum meetings (since 2018), attendance of the Blesbokspruit Trust meeting, attendance of the 2017 launch of the eastern basin AMD treatment plant. Many site visits to the East Rand were conducted, which included the Blesbokspruit wetland, Springs and Nigel communities, mining areas and farms, a tour of the AMD treatment plant, visits to the Stable Inn Conference Venue and the Riverside Conference and Wedding Venue, and the Marievale Bird Sanctuary with the Gauteng Wetland Forum. Personal and follow-up communication with key individuals and other stakeholders took place via telephone and e-mail, before or after forum meetings and after site visits. Telephone communications with Springs and Nigel community members (who formed part of the EIA process in 2014) were conducted on their post-views of the AMD STT. Observations of key individuals' interactions with the Blesbokspruit took place during site visits and observations of stakeholders during the forum meetings.

The purpose of conducting follow-up communication with community members who formed part of the EIA process was to identify whether they held the same views after the STT treatment began, as they did during the EIA process¹⁰. Some of the key individuals that were interviewed served as key informants, providing information on public meetings, new mining activities or communication between government officials regarding pollution incidents and providing links to other participants for the research. All participants used for the research were adults over the age of 18 years. Attendance of the Blesbokspruit Forum and Gauteng Wetland Forum, and site visits to the AMD treatment plant, the Blesbokspruit, agricultural areas, surrounding residential areas and tourist attractions formed a significant part of the research.

Secondary data included a combination of published literature (books, journal articles) on the Blesbokspruit, media reports, official government documents (including the EIA for the sludge disposals site and TCTA reports), national legislation, acts and policies pertaining to water, mining and the environment. Key

¹⁰The prominent community members interviewed for this study are part of the key interviews conducted because they are influential in the community; they attend the catchment forums, form part of the Blesbokspruit Trust and often referred to in media reports. The community members who were telephonically interviewed were chosen based on the comments they provided during the EIA process because they are property owners.

interviewees provided published and supposed publicly available documents that were not easily accessible, which assisted with the research. Such documents were useful in cases where some people did not want to be interviewed because they did not have permission from their department heads, for example.

In 2016, five scoping interviews were conducted with stakeholders. This included an environmental activist, Ms Mariette Liefferink, Chief Executive Officer (CEO) of the Federation for a Sustainable Environment, and four stakeholders within the agricultural sector, namely, Mr Bennie van Zyl from the Transvaal Agricultural Union, a farmer on the West Rand (at this stage the research area was still to be confirmed), Dr Piet Nell from the Agricultural Research Council (ARC) and an agricultural consultant on the East Rand. From these scoping interviews and reading newspaper articles, it was clear that the major topic of discussion with regard to the Blesbokspruit was on AMD treatment and its potential implications (or not) for the Blesbokspruit. The AMD STT in the eastern basin was launched in February 2017, and exploring and understanding the perceptions regarding the water quality of the Blesbokspruit in the context of the AMD STT proved relevant to various stakeholders. The scoping interviews assisted in formulating the research objectives. In addition, extensively reviewing the EIA documents compiled by Digby Wells Environmental early in the research process was essential to form a better understanding of the views of the various stakeholders on the proposed AMD STT and its anticipated impacts on the quality of water of the Blesbokspruit. Numerous stakeholders felt that their views were not being heard and that the EIA process was merely a tickbox exercise. The EIA documents indicated who the key individuals were among stakeholders and which areas were likely to be most affected by the establishment of the AMD treatment plant.

The section that follows provides a brief explanation of how the participants were selected, how the in-depth interviews were conducted and how observations took place. It is important to note that based on the variety of data collection methods used in this book the findings of the book represent the view of key individuals and stakeholders in general that are linked to the Blesbokspruit.

3.6.2 Selection of Participants, In-Depth Interviews and Observations

Purposive sampling and snowball sampling were used in this research to identify key individuals. Key is explained as those individuals among stakeholders who have expert knowledge on water quality and AMD treatment; those involved in the management of the Blesbokspruit catchment; those using the water of the Blesbokspruit; and those who live in the surrounding areas. This book does not claim that the individuals interviewed are a representative sample of a particular stakeholder group (e.g. tourism, agriculture, industry, community) or sphere of government or particular government department. The intention was not to identify a representative sample, but rather to conduct interviews with key individuals. Even though key

individuals were interviewed, it is not entirely an individualised process. It is possible that these individuals' thinking about the Blesbokspruit, and the treatment of AMD, is linked to, and influenced by, their stakeholder grouping.

Through reviewing media reports and official government documents and policies, further relevant individuals were identified. The scoping interviews also assisted in identifying additional individuals who were beneficial sources of information. Attendance of the catchment forums made it possible to identify other appropriate individuals for the research, that is, those who attended the meetings, what role they played and whether they would be beneficial to the research.

Even though purposive sampling was used, part of the sample was determined as the research progressed. For one, snowball sampling was used to find further relevant individuals. Snowballing worked well where an interview was requested with a specific individual, but the person was hesitant due to his or her organisational affiliation. In such cases, they provided useful suggestions to alternative people. After becoming familiar with who was directly involved in the AMD STT project team and who key individuals in the Springs community were, they too were approached for interviews. Other helpful community members were identified through the EIA documents reviewed for the research. Those members who frequently commented during the EIA public participation process and made comments that were valid for this research were contacted.

Each interview was structured based on the individuals' professional stance and affiliation to the Blesbokspruit catchment, and what role they played with regard to AMD STT and the management of the Blesbokspruit. It is important to note that some of the interviewees play more than one role in the Blesbokspruit due to various interests; for instance, they may live and work in the area. Some key individuals are associated with more than one stakeholder; for instance, those who are both residents and working for a stakeholder, such as the City of Ekurhuleni [CoE; formerly Ekurhuleni Metropolitan Municipality (EMM)]. Others owned property and had businesses in the tourism sector. Most of the prominent community members interviewed also played an environmental activist role. The information collected from each individual was based on these roles, and each response was used based on these roles to identify how social constructions are formed.

Observations were made during the catchment forums; at the launch of the AMD treatment plant; during site visits to the Blesbokspruit and surrounding mining and agricultural land, tourist attractions, including the Marievale Bird Sanctuary, and residential areas; and during a tour of the AMD treatment plant.

3.7 Conclusion

This chapter provided a background on the East Rand, the eastern basin, and the Blesbokspruit and its wetland. The relevance of this chapter was to place the Blesbokspruit in the context of mining on the East Rand and to showcase the importance of the Blesbokspruit based on the various uses of the water. The known water

uses can be grouped into five categories, namely (1) agriculture, (2) mining, (3) industry, (4) tourism and (5) domestic use. The next chapter explains how AMD became an issue in South Africa and, more specifically, the eastern basin, requiring AMD treatment to reduce its impact on the Blesbokspuit and its users of the water.

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