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A THESIS SUBMITTED IN FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE (WATER RESOURCE SCIENCE)

In the
INSTITUTE FOR WATER RESEARCH
FACULTY OF SCIENCE
RHODES UNIVERSITY

Title:

Analysing the equity dimensions and governance drivers of water security challenges in Hammanskraal, City of Tshwane, South Africa

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2024

DECLARATION

I **Malaika Lesego Samora Mahlatsi** hereby declare that this Master's research dissertation titled *Analysing the equity dimensions and governance drivers of water security challenges in Hammanskraal, City of Tshwane, South Africa* is wholly my own work and has not been submitted anywhere else for academic credit either by myself or another person. I understand what plagiarism implies and declare that this dissertation is my own ideas, words, phrase, arguments, graphics, figures, results and organisation except where reference is explicitly made to another's work. I understand further that any unethical academic behaviour, which includes plagiarism, is seen in a serious light by Rhodes University and is punishable by disciplinary action.

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ACKNOWLEDGEMENTS

I am sincerely grateful to my supervisor, Professor Nelson Odume, for his supervision of this work. There were many times when the process was both daunting and overwhelming, but at no point did his enthusiasm and support waver. His compassion was the glue that held everything together.

The assistance provided by the Gauteng MEC for Human Settlements and Infrastructure Development, Lebogang Maile, is immensely appreciated. I am thankful to Mzwandile Masina and Mduduzi Manana, who, through the Mzwandile Masina Foundation for Education and the Mduduzi Manana Foundation, respectively, provided material support for this research undertaking. Sincere gratitude is also extended to Dr Lulu Gwangwa for her selfless support and inexhaustible faith in my scholarly abilities.

My deepest gratitude to the former Zonal Coordinator of the African National Congress in Hammanskraal and current chairperson of Ward 75 in Temba, Michael “Kotiti” Aphane, for literally holding my hand over many months as I navigated the complex geo-histories of the people of Hammanskraal. Without the many hours that he committed to taking me around Hammanskraal and helping me to access the community and officials of the City of Tshwane metropolitan municipality (including ward councillors of Greater Hammanskraal) this research could never have been completed. I am also deeply grateful to Olebogeng Maboya, George “General” Matjila, Mugabe Ratshikuni and Kgabo Morifi for engaging with my work at various stages of its development.

Finally, my sincerest gratitude to my family, specifically my grandmother, Matshediso Mahlatsi, my sister Tshepiso Mahlatsi and my uncle Peter Jablin. Their support and encouragement was ceaseless. The journey to completing a research dissertation is physically taxing, emotionally gruelling and psychologically haemorrhaging. Without the necessary support, it would be impossible to survive it. These individuals carried me at my lowest and I am immeasurably grateful to and for them.

DEDICATION

This dissertation is dedicated to the people of Hammanskraal who, for many years, have been denied their basic human right to access safe and clean drinking water.

It is also dedicated to my mother, Dipuo Mahlatsi, who lost her battle to cancer in 2017. I know that as social justice activist, she would have been immensely proud of this work that illustrates the layered ways in which water insecurity arising from poor governance is a violation of human rights. She is the star of the story that I will always tell.

ABSTRACT

South Africa is faced with a national water security challenge that is increasingly worsening due to a myriad of structural and governance factors. Over the past few years, several municipalities across the country have experienced temporary loss of water access, while some have come dangerously close to Day Zero – a day when water levels of the major dams supplying water to residents would become critically low, resulting in households having no running water. But for the people of the township of Hammanskraal in the City of Tshwane metropolitan municipality, water insecurity has reached crisis point. Since 2005, the township has been battling with a chronic lack of access to safe drinking water. The water quality in Hammanskraal has been so dire that in 2019, the South African Human Rights Commission declared it unfit for human consumption and deemed it a violation of human rights. Despite this, the crisis has persisted. In 2023, Hammanskraal became the epicentre of a cholera outbreak that claimed a number of lives in several provinces across the country. Using a qualitative approach, this study analyses the equity dimensions and governance drivers of water security challenges in Hammanskraal. Through interviews with residents in Hammanskraal and government officials in the City of Tshwane metropolitan municipality and the Gauteng Provincial Government, the study explores the lived experiences of those affected by the water insecurity, as well as the governance drivers that inform the crisis. The study, using water justice theory and conflict theory/Marxism, contends that the water security challenges in Hammanskraal are driven by physical, economic and political factors. These factors have their roots in the geo-history of the township as well as contemporary responses to spatial development and water resource management by the post-apartheid government. The study finds that there are equity dimensions to the water security challenges in Hammanskraal. Contextually, the legacy of apartheid's policy of separate and uneven development, coupled with contemporary failings of the implementation of the National Water Act, impact water access. In terms of water governance, while factors such as climate change and urbanisation are contributing determinants, the water security challenges in Hammanskraal are fundamentally the result of institutional failings that include lack of planning and investment as well as lack of infrastructure maintenance. The implications for South Africa in general is that failure to resolve water inequities and to strengthen water governance will result in the reproduction and persistence of structural inequalities. Key recommendations of the study include the expansion of the Temba Water Purification Plant, strengthening and coordination of institutions for water security, the setting of water allocation ceilings in Gauteng

municipalities and investment in alternative water sources and tools for water conservation. The study also recommends further study into the extent to which water security challenges impact social unrest in South Africa.

ACRONYMS AND ABBREVIATIONS

AMD – Acid mine drainage

ANC – African National Congress

AsgiSA - Accelerated and Shared Growth Initiative for South Africa

AU – African Union

CBOs – Community-based organisations

ConCourt – Constitutional Court of South Africa

CoT – City of Tshwane

CMAs – Catchment Management Agencies

CSIR – Council for Scientific and Industrial Research

DA – Democratic Alliance

DBSA – Development Bank of Southern Africa

DWAF – Department of Water Affairs and Forestry

DWS – Department of Water and Sanitation

GPG – Gauteng Provincial Government

LHWP – Lesotho Highlands Water Project

MDGs – Millennium Development Goals

NAEHMP - National Aquatic Ecosystem Health Monitoring Programme

NCMP – National Chemical Monitoring Programme

NDP – National Development Plan

NEMA - National Environmental Management Act 107 of 1998

NGOs – Non-governmental organisations

NIP – National Infrastructure Plan

NWA - National Water Act 36 of 1998

NWRI – National Water Resources Infrastructure Programme

NWRS – National Water Resource Strategy

REMP - River Eco-status Monitoring Programme

RHP - River Health Programme

RWPS – Raw Water Pricing Strategy

SACN – South African Cities Network

SAHRC – South African Human Rights Commission

SDGs – Sustainable Development Goals

SIPs - Strategic Integrated Projects

SWPN-SA – Strategic Water Partners Network South Africa

UN – United Nations

UN-Water – United Nations Water

WAR - Water Allocation Reform Programme

WfGD – Water for Growth and Development Framework

WRC – Water Research Commission

WUAs – Water User Associations

WWTW – Wastewater Treatment Works

CONTENTS

DECLARATION	ii
ACKNOWLEDGMENTS	iii
DEDICATION	iv
ABSTRACT	v
ACRONYMS AND ABBREVIATIONS	vii
CHAPTER 1: CONTEXTUAL SETTING OF THE STUDY	
1.1.INTRODUCTION	1
1.2.RESEARCH CONTEXT: BACKGROUND	9
1.3.RATIONALE AND SIGNIFICANCE	10
1.3.1. Main research question	13
1.3.2. Aim of the study	14
1.3.3. Objectives of the study	14
1.4.SCOPE OF THE STUDY	14
1.4.1. Spatial scope	14
1.4.2. Temporal scope	17
1.5.ORGANISATION OF THE STUDY	18
CHAPTER 2: CONCEPTUAL AND THEORETICAL INSIGHTS OF WATER INSECURITY	
2.1. INTRODUCTION	20
2.2. THEORIES OF WATER INSECURITY	23
2.2.1. Malthusian theory	26
2.2.2. Catastrophe theory	27

2.2.3. Conflict theory	29
2.2.4. Water justice theory	31
2.3. ORGINS AND HISTORY OF WATER INSECURITY IN SOUTH AFRICA	33
2.4. WATER POLICIES AND FRAMEWORKS IN SOUTH AFRICA	40
2.4.1. The Constitution of the Republic of South Africa Act 108 of 1996	41
2.4.2. National Water Act 36 of 1998	43
2.4.3. National Water Resource Strategy	46
2.4.4. National Water Resources Infrastructure Agency Bill	48
CHAPTER 3: RESEARCH METHODOLOGY AND DESIGN	
3.1. INTRODUCTION	50
3.2. RESEARCH PARADIGN/PHILOSOPHY	50
3.3. RESEARCH DESIGN	52
3.4. POPULATION	53
3.5. SAMPLING	54
3.6. DATA COLLECTION AND PROCEDURES	55
3.6.1. Interviews	55
3.7. DATA ANALYSIS	58
3.8. VALIDITY AND RELIABILITY	60
3.9. ETHICAL CONSIDERATIONS	61
3.9.1. Voluntary participation	61
3.9.2. Informed consent	61
3.9.3. Confidentiality	62
3.9.4. Protection from harm	62

3.9.5. Communicating results	62
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CHAPTER 4: EQUITY DIMENSIONS OF WATER SECURITY CHALLENGES IN HAMMANSKRAAL

4.1. INTRODUCTION	63
4.2. METHODS OF DATA COLLECTION	66
4.3. RESULTS	66
4.3.1. The experience of water security challenges in Hammanskraal	66
4.3.2. The 2023 cholera outbreak in Hammanskraal	76
4.4. DISCUSSION	80
4.4.1. The socio-economic impacts of water security challenges on the residents of Hammanskraal	80
4.4.2. The socio-political impacts of water security challenges in Hammanskraal	82
4.5. CONCLUSION	84

CHAPTER 5: GOVERNANCE DRIVERS OF WATER SECURITY CHALLENGES IN HAMMANSKRAAL

5.1. INTRODUCTION	86
5.2. METHODS OF DATA COLLECTION	87
5.3. PARTICULARITIES OF GOVERNANCE DRIVERS OF WATER INSECURITY IN HAMMANSKRAAL	88
5.4. POLLUTION OF WATER RESOURCES IN HAMMANSKRAAL: A CASE OF THE APIES RIVER	98
5.5. A GOVERNANCE CRISIS EVIDENCED BY POOR INFRASTRUCTURE	106
5.6. ENVIRONMENTAL IMPACTS OF POOR WATER GOVERNANCE IN HAMMANSKRAAL	110

5.7. ECONOMIC IMPACTS OF POOR WATER GOVERNANCE IN HAMMANSKRAAL	114
5.8. CONCLUSION	120
 CHAPTER 6: RECOMMENDATIONS AND CONCLUSIONS	
6.1. INTRODUCTION	121
6.2. SUMMARY OF FINDINGS	122
6.3. RECOMMENDATIONS	131
6.3.1. Upgrade of the Rooiwal Wastewater Treatment Works and expansion of Temba Water Purification Plant	131
6.3.2. Investment in alternative water sources and tools for water conservation	133
6.3.3. Setting of water allocation ceilings in Gauteng municipalities	135
6.3.4. Strengthen and coordinate institutions for water security.	136
6.4. SUGGESTED AREAS OF FURTHER STUDY	139
6.5. STUDY LIMITATIONS	141
6.6. CONCLUSION	142
 REFERENCES	 143
 ANNEXURES	
ANNEXURE A: Participant consent form	176
ANNEXURE B: Letter to the Gauteng Department of Human Settlements and Infrastructure Development	179
ANNEXURE C: Response letter from the Gauteng Department of Human Settlements and Infrastructure Development	180
ANNEXURE D: Letter to Prof. M Maserumule, Tshwane University of Technology	182

ANNEXURE E: Response letter from Prof. M Maserumule, Tshwane University of Technology	184
ANNEXURE F: Letter to the South African Association of Public Administration and Management	185
ANNEXURE G: Response letter from the South African Association of Public Administration and Management	187
ANNEXURE H: Interview questions	188
ANNEXURE I: Ethics approval letter	191
ANNEXURE J: Proof of professional editing letter	193

LIST OF FIGURES

FIGURE 1.1: OECD Principles of Water Governance	7
FIGURE 1.2: Map of the City of Tshwane	16
FIGURE 1.3: Map of Greater Hammanskraal	17
FIGURE 3.1: Basic questions of a research paradigm	52
FIGURE 3.2: Preparation, organising and resulting phases in the content analysis phase	59
FIGURE 4.1: House with domestic water storage tank	69
FIGURE 4.2: Tap water in Kudube Unit 1, Hammanskraal	71
FIGURE 4.3: Spaza shop selling bottled water in Temba	72
FIGURE 4.4: Broken down water truck on Lucas Mangope Road	75
FIGURE 4.5: Shop selling purified water on Main Road	77
FIGURE 4.6: Sale of purified water in Temba	78
FIGURE 4.7: Community meeting	79
FIGURE 5.1: A plaque at the Temba Water Purification Plant	92
FIGURE 5.2: Reservoirs at the Temba Water Purification Plant	93

FIGURE 5.3: Urban water runoff in Refentse (Stinkwater)	95
FIGURE 5.4: A burst pipe causing fissures on the road surface in Refentse	97
FIGURE 5.5: A burst sewage pipe in Temba	98
FIGURE 5.6: Leeuwkraal Dam	100
FIGURE 5.7: Pollution of the Apies River	101
FIGURE 5.8: Pollution and vandalism at the Leeuwkraal Dam Wastewater Treatment Facility	102
FIGURE 5.9: Razor-fence protecting infrastructure at Leeuwkraal Dam	103
FIGURE 5.10: A resident of Temba collecting water from the Apies River	104
FIGURE 6.1: Equity dimensions of water insecurity in Hammanskraal	124

LIST OF TABLES

TABLE 3.1: Qualitative data sample size	54
TABLE 3.2: Interview schedule (physical)	56
TABLE 3.3: Interview schedule (telephonic)	57

CHAPTER 1: CONTEXTUAL SETTING OF THE STUDY

CHAPTER SUMMARY

This chapter outlines a contextual setting for the study by providing an overview of the introduction and background, which have laid a basis for the backdrop against which the research undertaking is framed. The research problem and problem statement outline the questions and contradictions that the research seeks to answer in relation to the nature of the water security challenge in Hammanskraal. The main question, which lays the foundation for the research undertaking, is outlined. The aim and objectives of the study are comprehensively articulated, providing insight into what the research seeks to analyse and explores. The research scope is outlined. The temporal scope illustrates the years which the water security challenge and related governance processes have occurred, providing a comprehensive barometer that examines how Hammanskraal got to the state of water insecurity that it is in. The spatial scope gives a critical background to the spatial histories and politics of Hammanskraal, which are important in understanding how the township's water challenges shape and are shaped by historical and contemporary constructs. The rationale and significance of the study are outlined. These explain the necessity of the research undertaking and the motivation for it. The chapter concludes with an outline of the organisation of the study.

1.1.INTRODUCTION

The question of water security has become an important part of discourse in both developed and developing countries across the world (Klobucista and Robinson, 2023). As human activity becomes a dominant influence on the environment in the prevailing Anthropocene era, debates about the sustainable use of natural resource have intensified, anchored on the recognition of the parlous effects of humanity on the Earth's systems. According to Rockström et al. (2014) the influence of humans on the global hydrological cycle has become the dominant force behind changes in water resources across the world and in regulating the resilience of the Earth system. Human activity has not only shaped the changes in water resources but has also impacted on their interactions with other systems of the Earth. As such, emerging threats to human water security have become global in nature (Vörösmarty *et al*, 2010) as the entire world is confronted with a new global level of water concern. This concern is especially pronounced

in developing regions of the world where prevailing structural and governance challenges have an impact on water access and distribution.

Water has emerged the most important natural resource, not only due to its scarcity, but for the reason that it is essential to all life on earth. According to the American Geosciences Institute (2023a) despite water being seemingly abundant on the planet, more than 97 percent of this water is in oceans where it is oversaturated with salt, resulting in the Earth having less than 3 percent freshwater that is used for human consumption, agriculture and industrial purposes. Compounding the challenge of freshwater availability is the issue of its distribution. Almost all the water that is available for human use is groundwater, as well as contained in rivers and lakes. But these natural formations are not evenly distributed across the world, and continents such as Africa and Asia have the least river water availability, with water availability in Africa being 2.4 times lower than that of the world land area (Shiklomanov, 2009:231). This scarcity and uneven geographical distribution of water is not only a question of geomorphology, but a socio-political and geo-political. According to the Pacific Institute (2019) there are several dimensions of water in geopolitics. The first is that water resources and infrastructure are often casualties of violent confrontation. The second is that water resources can be used as a tool in achieving one side's political, economic, or military interests. And the third is that of water security challenges may cause dispute over control of water resources. This is explored by Spector (2000) and Gregory (2013), though the latter contends that tensions over water have historically been resolved through cooperation rather than conflict. Scholars such as Postel and Wolf (2001), Farnum (2018) and Ullrichova (2021) posit that while conflict is rarely ever the result of a single variable, access to water is increasingly emerging as an important catalyst. This illustrates the significance of water and by extension, water security. The issue of scale, both spatial and temporal, plays a significant role in the way that socio-politics influence water. Water security analyses that focuses on whole countries or regions tend to create a situation where "hotspots of insecurity become obscured and distributional issues amongst different communities are invisible" (Doeffinger and Hall, 2021). In their study assessing water security across scales, with the United States of America as a case study, Doeffinger and Hall (2021) contend that data demonstrates that there is greater spatial heterogeneity than might previously have been assumed. This means that water security is uneven both at a national scale and within communities. The water security challenges in the City of Flint, Michigan, is a pellucid example. The United States as a country and Michigan as a state are deemed water secure.

However, the City of Flint experienced water security challenges resulting from problems with wastewater treatment (Fonger, 2016). Furthermore, the spatial distribution of the contaminated water was uneven, with data demonstrating that certain areas within the city experienced less contamination than others. According to Chaaoui (2022) this is reflective of racism in public health, given that the areas most affected in Flint are predominantly Black.

But what is water security and how is it measured?

There are various definitions of water security. The Sustainable Water Partnership (quoted in Viala, 2024) defines water security as: “The adaptive capacity to safeguard the sustainable availability of, access to, and safe use of an adequate, reliable and resilient quantity and quality of water for health, livelihoods, ecosystems and productive economies”. This definition has been expanded by the United Nations-Water, which argues that there is a political dimension to water security as water insecurity can and often does lead to cascading political, social, economic and environmental consequences. Thus, the United Nations-Water defines water security as: “The capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability” (UN Water, 2013). Conway (2023) contends that an essential feature of water security is the recognition of the significant interconnections between the physical and social systems around water resources. This effectively means that human activities shape and are shaped by water systems. This is in alignment with the definition of water security as provided by the South African government, according to which: “Water security is less about obtaining water, and more about fostering human capabilities as they relate to water... It is not simply a state of adequate water – however defined – to be achieved, but rather a relationship that describes how individuals, households, and communities navigate and transform hydro-social relations to access the water that they need and in ways that support the sustained development of human capabilities and wellbeing in their full breadth and scope” (National Planning Commission, 2020: 5-6). In this study on water security challenges in Hammanskraal, the United Nations-Water definition of water security is used.

Water security is so critical to the global development agenda that it is one of the seventeen Sustainable Development Goals (SDGs) that were formulated by the United Nations General Assembly as part of the Post-2015 Development Agenda, replacing the Millennium Development Goals (MDGs). The SDGs were adopted in a UN General Assembly Resolution Agenda 2030. Sustainable Development Goal 6 aims to “ensure availability and sustainable management of water and sanitation for all” with the six targets being to ensure: (1) safe and affordable drinking water (2) end open defecation and provide access to sanitation, and hygiene (3) improve water quality, wastewater treatment and safe reuse (4) increase water-use efficiency and ensure freshwater supplies (5) implement integrated water resource management and (6) protect and restore water-related ecosystems. Linked to target 6 is the aim to (6a) expand water and sanitation support to developing countries and (6b) support local engagement in water and sanitation management (UNICEF and WHO, 2019).

Inadequate investments in water and water related infrastructure and institutions as well as systemic governance failures have contributed to the growing levels of water security challenges. According to the United Nations Children’s Fund (UNICEF, 2023), four billion people, accounting for almost two thirds of the world’s population, experience severe water scarcity for at least one month each year. Additionally, over two billion people live in countries where water supply is inadequate. Looking into the future, UNICEF (2023) contends that half of the world’s population could be living in areas facing water scarcity by as early as 2025 and that approximately 700 million people could be displaced by intense water scarcity by 2030. Equally concerning is that according to UNICEF (*ibid*) by 2040, roughly 1 in 4 children worldwide will be living in areas of extremely high water stress.

Water equity is an important dimension in the water security discourse, particularly in a country like South Africa that has a history of colonialism and apartheid – systems that were built on the foundation of separate development. According to Findley and Ogbu (2011) separate development extended beyond the creation of homelands for the indigenous people of South Africa, into the architecture and infrastructure that different racial groups could have access to. In post-apartheid South Africa, vestiges of the old dispensation can still be gleaned. Findley and Ogbu contends that a class barrier that follows the old racial lines persists even decades into democracy, and that this is especially evident in the spatiality of South Africa and issues

of access to infrastructure, both physical and economic. This necessitates that when studying water security challenges in the country, issues of equity must be at the centre.

As with water security, there are various definitions of water equity. Freshwater, a leading non-profit organisation dedicated to preserving clean, sustainable water that is vital for healthy communities and ecosystems, defines water equity as: “a just and equitable system of water benefits for all people, including having communities that are resilient in the face of climate changes” (Freshwater, 2021). The Kyl Center for Water Research at the Morrison Institute (2021) posits that water equity occurs when all communities have access to safe, clean, and affordable drinking water. Water equity is also defined as “the proportional and equitable distribution of water related to environmental benefits and risks among diverse economic and cultural communities” (Riggs, 2016:6). The issue of risk is a recognition that different economic and cultural communities experience water security differently. Thus, Riggs (*ibid*) goes on to assert that water equity “ensures that policies, activities, and government responses do not differentially impact diverse social, cultural, and economic groups”. In this study, all these definitions are used, interlinking access to clean and sustainable water, proportional and equitable distribution, water policy that involves communities and resilience in the face of climate change.

Systems of water governance are often a reflection of political realities at a global, regional, national and local scales. According to Batchelor (2008) there is a political element to water governance, because of which, the very definition of governance, inter alia water governance, is contested. But to understand water governance, it is important to define governance itself. The United Nations Development Programme (1997) defines governance as: “The exercise of political, economic and administrative authority in the management of a country’s affairs at all levels. Governance comprises the complex mechanisms, processes, and institutions through which citizens and groups articulate their interests, mediate their differences, and exercise their legal rights and obligations”. In line with this definition of governance broadly, water governance is defined as “the range of political, social, economic and administrative systems that are in place to develop and manage water resources and the delivery of water services at different levels of society” (Rogers and Hall, 2003). Batchelor (2008:2) further states that “water governance covers the manner in which allocative and regulatory politics are exercised

in the management of water and other natural resources and broadly embraces the formal and informal institutions by which authority is exercised”. These definitions underpin this study.

Principles of water governance are outlined by the OECD with the aim of contributing to “tangible and outcome-oriented public policies, based on three mutually reinforcing and complementary dimensions of water governance” (OECD, 2024). The three values of good water governance are: effectiveness, efficiency and trust/stakeholder engagement. In terms of effectiveness, this relates to the contribution of governance to define clear sustainable water policy goals and targets at all levels of government, as well as their implementation and fulfilment. Efficiency refers to the contribution of governance to the maximisation of the benefits of sustainable water management and welfare at the least cost to society. This relates to the nexus of water as a public good and water as an economic activity – an issue that is engaged upon later in this study. And lastly, the dimension of trust/stakeholder engagement relates to the contribution of governance to building public confidence and ensuring the inclusiveness of stakeholders through democratic legitimacy and fairness for society at large. Figure 1.1 provides an overview of the necessary governance interventions that must be in place to enable the actualisation of these three values of water governance.

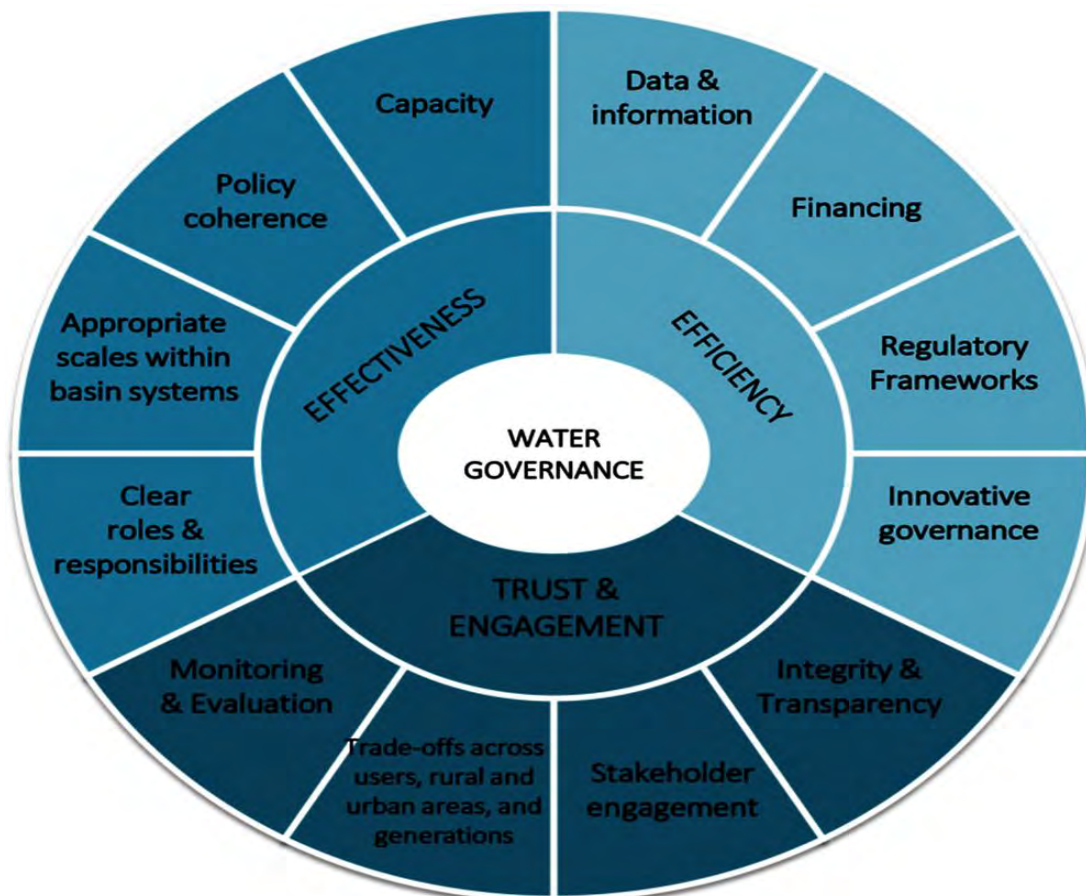


Figure 1.1: OECD Principles of Water Governance

Source: OECD, 2015:1

As illustrated by Figure 1.1, the overarching principle of enhancing the effectiveness of water governance necessitates the clear definition of roles and responsibilities for water policymaking, policy implementation, operational management and regulation. Additionally, it requires the management of water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions and foster co-ordination between the different scales. Furthermore, there must be policy coherence through effective cross-sectoral co-ordination and the strengthening of capacity of the responsible authorities to the complexity of water challenges to be met. The overarching principle of enhancing the efficiency of water governance is also anchored on four principles. The first is to produce, update and share timely, consistent, comparable and policy-relevant water and water-related data and information, and use it to guide, assess and improve water policy. In addition to this, governance arrangements must help with the mobilisation of water finance and allocating financial resources in an efficient, transparent and timely manner. Furthermore, coherent water management regulatory frameworks must be effectively implemented and enforced. And finally, there must be implementation of innovative water governance practices across responsible authorities, levels

of government and relevant stakeholders. The overarching principle of enhancing trust and engagement in water governance depends on mainstreaming integrity and transparency practices across water policies, water institutions and water governance frameworks for greater accountability and trust in decision-making. Additionally, stakeholder engagement for informed and outcome-oriented contributions to water policy design and implementation must be promoted. This also requires water governance frameworks that help manage trade-offs across water users, rural and urban areas, and generations. Finally, it is important to ensure that there is regular monitoring and evaluation of water policy and governance where appropriate. The results of this process must be shared with the public and where necessary, adjustments must be made. While the OECD principles of water governance bear relevance to South Africa, the country's colonial and apartheid history has also necessitated the inclusion of values that relate not only to efficiency but also to equity and sustainability.

Poor water governance can create or exacerbate water scarcity. Water scarcity describes the growing lack of access to water. There are two types of water scarcity: economic and physical. According to Mlaba (2022) economic water scarcity refers to water being inaccessible because of institutional failings that include lack of planning, investment, and infrastructure. Physical scarcity, on the other hand, is the result of natural scarcity, such as in a desert. This is often exacerbated by climate change which worsens droughts and changes in weather patterns. The African continent is dealing with both types of water scarcity challenges. While the state of water security in the world is evidently perilous – it is especially more so in sub-Saharan Africa. According to Mlaba (2022) at least 400 million people in sub-Saharan Africa do not have access to basic drinking water. In addition to this, citizens within the said region travel 30 minutes on average to access water (*ibid*). In South Africa, both types of water scarcity are experienced.

This study focuses on the equity dimensions and governance drivers of water security challenges in the township of Hammanskraal. It analyses the development of water challenges and how this has affected households and businesses in the area. Importantly, it explores the governance drivers, both historical and contemporary, that have architected or exacerbated this challenge.

1.2. RESEARCH CONTEXT: BACKGROUND

In September 2021, the South African Human Rights Commission (SAHRC), accompanied by officials from local and national government, visited the Temba Water Purification Plant and Rooiwal Waste Water Treatment Works in Hammanskraal, a township located in the north of Pretoria. The visit was a response to the City of Tshwane's decision to shut down the Temba plant a month prior, contending that the quality of water had deteriorated due to equipment failure (Rafapa, 2021). This had led to households in Hammanskraal being without water for over a week. This, however, was not an isolated incident. According to Evans (2021a) the water crisis in Hammanskraal can be traced back to 2005, driven in part by the fact that the Rooiwal Wastewater Treatment Plant does not have the capacity to meet the expanding population demands, which has led to sewage spills. The plant was built in the 1960s for a small population, but presently, more than 40 percent of the population within the City of Tshwane metropolitan municipality rely on it (Evans, 2021b). Another contributing factor is that the plant is not maintained properly, causing the water to be contaminated. For the purpose of clarity, it is important to make a distinction between wastewater treatment work and drinking water treatment work. The former refers to a process where contaminants from wastewater or sewage are removed and converted this into an effluent that can be returned to the water cycle. Once returned to the water cycle, the effluent creates an acceptable impact on the environment or is reused for various purposes, such as irrigation. Drinking water treatment work is a process public drinking water system use different water treatment methods to provide safe drinking water for communities. According to the Centers for Disease Control and Prevention (2022), public water systems often use a series of water treatment steps that include coagulation, flocculation, sedimentation, filtration, and disinfection.

Various tests had been run on water in Hammanskraal previously, and these showed that tap water in the township contains high concentrations of nitrites (NO_2) and nitrates (NO_3), as well as traces of *E. coli* (Pombo van-Zyl, 2019). The dangers of high nitrates in drinking water have been studied by scholars such as Ward *et al* (2018), who contend that there is a causal relationship between the ingestion of nitrate-contaminated water and the development of diseases such as colorectal cancer, bladder, and breast cancer and thyroid diseases. According to Greer and Shannon (2005) water high in nitrates can also cause neural tube defects, resulting in methemoglobinemia in infants. These consequences came to pass in Hammanskraal in 2023

when the township experienced an outbreak of cholera that claimed the lives of a number of people. According to the Department of Water and Sanitation (2023a) there is a very high likelihood that the outbreak was caused by the pollution of water sources in the area.

The water security challenges experienced by the people of Hammanskraal are largely rooted in political factors. As indicated, Hammanskraal is a township that was formerly part of the apartheid homeland of Bophuthatswana, and experienced segregation and separate development that had an impact on its infrastructure. Additionally, the ongoing poor water governance by the City of Tshwane metropolitan municipality, which is explored in-depth in the following chapters of this study, have worsened the water security challenges in Hammanskraal, while prioritising water provision in more affluent areas of the municipality. This speaks to water equity as well as water governance issues that have necessitated this study. This study analyses the experiences of the people of Hammanskraal with the water security challenges in their area. It also analyses how they have navigated the challenges of contaminated water, and the efficacy of the interventions that have been implemented by the City of Tshwane metropolitan municipality as well as the provincial and national governments.

1.3. RATIONALE AND SIGNIFICANCE

Many scholars have produced studies on the water security problems in South Africa. These include Basson (2011); Karodia and Khan (2015); Donnenfeld *et al* (2018); Viljoen and van der Walt (2018); Mutamba (2019); Igamba (2022), to name but a few. While these studies have been relevant to the understanding of water security challenges confronting South Africa, few have provided a geo-historical perspective that assesses not only the governance drivers, but the equity dimensions of water insecurity. Furthermore, a significant number of these studies did not centre the experiences of working-class households in townships with water security challenges. Such an approach has resulted in instances of flawed findings, such as the Muller *et al* (2009) study which sought to understand the nature of South Africa's water crisis and to assess its level of water security. The study was commissioned by the Development Bank of Southern Africa. It concluded that South Africa did not have a national water crisis. This was despite the fact that several townships, including Hammanskraal, had already been battling water insecurity challenges by the time of the study's commissioning. And although there have been some studies done on water security challenges in smaller municipalities, such as the

critical study on water service delivery challenges in Makana Local Municipality by Weaver *et al* (2017), few water security studies are done with townships as case studies.

The lack of dedicated focus on water security challenges in townships is concerning due to the fact that townships are critical in the South African geographic landscape where the exponential increase in urban population means townships are fundamentally an urban problem and as such, urban challenges are inherently township problems. In the South African context, townships refer to underdeveloped high-density residential areas built on the periphery of towns and cities. Townships are racially segregated urban areas that were historically reserved for “non-Whites”, namely Black African, Coloured and Indian people. Approximately 21.7 million of the 60.8 million people in South Africa live in townships, with the Gauteng Province having the largest township population at 8.1 million (Schwabe, 2020). The water insecurity question in Hammanskraal is so critical that it was the key decider in the voting choices of the township’s residents in the previous local government elections. According to an investigative piece by Tshikalange (2021), on the day of voting, many voters raised the issue of clean water as their major concern, arguing that they would be voting for change primarily for the water security crisis to be resolved.

The water security challenges in Hammanskraal are a microcosm of the water security challenges in the rest of South Africa. This is evidenced by the 2023 Blue Drop Watch Report that provides a technical assessment of the conditions of drinking water treatment and distributions across metropolitan, district and local municipalities in the country. The report comprises of three watch areas, namely the drinking water quality (DWQ), the technical site assessment scores (TSA) and the very rough order of measurement (VROOM) which provide an estimate of the funding required to restore the existing treatment infrastructure to its intended design capacity and operations (Department of Water and Sanitation, 2023b: ix). The findings of the report indicate that 51 percent of municipalities across South Africa have poor to bad microbiological water quality status, while a staggering 71 percent of plants in municipalities do not achieve chemical compliance. According to the DWS, the implication is that poor quality water is produced and distributed to the consumer by municipalities (*ibid*: x). The decline in water quality across South African municipalities has serious consequences for the country and its people. In May 2023, the township of Hammanskraal became the epicentre

of a devastating cholera outbreak that would go on to spread across the country. According to the national Department of Health (2023) by the end of the first week of June, the country had recorded a total cumulative number of 166 laboratory-confirmed cases and 202 suspected cases of cholera in five provinces - namely Gauteng, Free State, Mpumalanga, North West and Limpopo – with the death-toll standing at 31. This study is necessitated by these outlined factors and their implications for the future of South Africa’s water security. There is empirical evidence that the water insecurity challenge in Hammanskraal has implications for the political future of the administrative capital, as evidenced by Tshikalange (2021). Furthermore, the crisis in Hammanskraal offers a glimpse into how the manifestations of poor water governance could pose a crisis of ecology, economy and the very lives of people.

As of 2022, the population of South Africa has surpassed the 60 million mark. This is in alignment with the projections made by the United Nations Food and Agriculture Organization (FAO) in its The State of the World’s Land and Water Resources for Food and Agriculture Report that estimated that by 2050, the world’s population would have increased significantly, to over 9 billion, with the greater proportion of this population being in the developing world, particularly in the sub-Saharan region (FAO, 2021). Despite this, water resources, which are finite, will be depleting substantially, increasing a water scarcity crisis that is already affecting nearly half of the world’s population today. At the core of dealing with this imminent reality, the report contends, is strengthening water governance mechanisms.

The water crisis in Hammanskraal is not only about the collapse of water infrastructure in the City of Tshwane broadly. It is, in many ways, a collapse of governance. In addition to this, it is fundamentally a question of the violation of human rights. In August 2019, after taking water samples to the Council for Scientific and Industrial Research (CSIR) laboratory for microbiological, chemical, and physical analysis, the SAHRC declared that the water is unfit for human consumption (SAHRC, 2019). This is a clear violation of the rights of the people of Hammanskraal. Safe and clean drinking water is a universal right, recognised as a key development goal in the Sustainable Development Goals. Furthermore, Chapter 2 of the Constitution of South Africa provides that “Everyone has the right to have access to sufficient food and water”. This right is given effect by the Water Services Act (Act no 108 of 1997),

whose primary purpose is to provide for the right to basic water supply and basic sanitation services.

The struggle for safe and clean drinking water in Hammanskraal is a pursuit of water justice, which is linked to ecological sustainability (Sultana, 2018). In this regard, the significance of this study is to demonstrate the ways in which water insecurity, resulting from both physical and non-physical factors such as poor governance and poor infrastructure, impedes on human rights and facilitates underdevelopment in working-class communities like Hammanskraal and the developing world at large. This research analyses the equity dimensions and governance drivers of water security challenges in Hammanskraal and make recommendations towards the development and establishment of strong water management institutions. It contributes to the knowledge gap on the water security and governance challenges in townships and how these have resulted in the emergence of complex environmental and ecological vulnerabilities for the urban working-class who have historically been at the margins. Importantly, as the study was undertaken at the height of the cholera outbreak that began in Hammanskraal in May 2023 (Mahlatsi, 2023a), it provides insight into how township residents develop tools for resilience in the face of water crises and water governance failures. Understanding the equity dimensions and governance drivers of water security challenges in townships like Hammanskraal enables a critical assessment not only of the nature of South Africa's water crisis, but of the possible solutions required to alleviate it.

1.3.1. Main research question

Over the last two decades, the water infrastructure in Hammanskraal, which was originally designed for use by a smaller population, has deteriorated significantly (Chagopa, 2023). . But while this may be a natural outcome of population growth, urbanisation and changing weather patterns across the world, the water security challenges confronting the township of Hammanskraal also has its roots in historical and contemporary structural and governance constructs. These have affected not only the nature of water security challenges in the township, but how they are experienced by the residents. The foundational question of this research undertaking is thus: *What are the equity dimensions and governance drivers of water security challenges in the township of Hammanskraal, City of Tshwane metropolitan municipality, South Africa?*

1.3.2. Aim of the study

The aim of this study is to analyse the equity dimensions and governance drivers of water security challenges in the township of Hammanskraal, City of Tshwane.

1.3.3. Objectives of the study

Objective 1

To analyse how and why water security challenges have manifested in Hammanskraal, City of Tshwane.

Objective 2

To assess the equity dimensions of the water security challenges in Hammanskraal, City of Tshwane.

Objective 3

To explore the governance drivers contributing to water security challenges in Hammanskraal, City of Tshwane.

1.4.SCOPE OF THE STUDY

The spatial and temporal scopes help to situate the study in a reality of a South Africa that is evolving, and whose socio-spatial dialectic is consistently shaping its political, social, economic and environmental futures.

1.4.1. Spatial scope

Hammanskraal, formerly part of the Bophuthatswana homeland, is a trans-provincial region located to the north of Tshwane in the Gauteng Province and falls within the City of Tshwane (Figure 1.1) metropolitan municipality – the administrative capital of South Africa. It consists of multiple residential, industrial and commercial areas in a decentralised settlement pattern. Hammanskraal is divided into four main areas namely Hammanskraal, Mahube, Mathibestad

and Temba. These locations, combined, make up Greater Hammanskraal (Figure 1.2), which is referred to entirely as Hammanskraal. As with all apartheid-era townships, Hammanskraal is divided into sections within these four locations. For example, Temba is divided into fifteen sections, namely Kudube Unit 1, Kudube Unit 2, Kudube Unit 10, Kudube Unit 11, Manyeleti, Leboneng, Kudube Unit D, Temba Unit 1, Temba Unit 2, Temba Unit 6, Temba Unit 7, Sekampaneng, Sekampaneng SP, Temba Unit D and Unit D Extensions (Census, 2011). Other areas in Hammanskraal include Refentse (formerly Stinkwater) to the far west, Carousel View to the north-east and Rens Town to the far east. The former is a medium-density neighbourhood with a largely middle-class population. With a population of 120 513 (World Population Review, 2023) and a population density of 2,800/km² concentrated within a total land area of 7.60 km² (Census, 2011), Hammanskraal is one of the most densely populated areas in Gauteng (Hamman and Parker, 2020). According to StatsSA (2022), at least 98.3 percent of the population is Black African.

Hammanskraal has one of the highest rates of crime in South Africa, particularly violent and sex crimes. According to the crime statistics released by the South African Police Service in November 2021, Temba Police Station had the highest number of reported rape cases in the entire country. The South African Broadcasting Corporation (2021) stated that with the number of reported rapes in Hammanskraal, the township had effectively become the “rape capital of South Africa” as it had surpassed Inanda, a township in eThekweni (Durban) that had previously been number one with regard to the number of reported rape cases. Hammanskraal, particularly the Temba area, also has high levels of contact crimes as well as an increasingly growing level of mob justice, which scholars such as Professor Johan Burger from the Institute for Security Studies attribute to a loss of confidence in the SAPS and the criminal justice system (Makhetha and Dlamini, 2021).

Figure 1.2 illustrates the geographical location of the City of Tshwane in relation to the Gauteng Province. This figure shows the location of Hammanskraal within the Tshwane metropolitan municipality, indicating that the township is bordered to the west by Soshanguve and to the south by Montana, The Orchards and Theresapark. The City of Tshwane is located in the north of the Gauteng Province, about 60km from the centre of Johannesburg.



Figure 1.2: Map of the City of Tshwane

Source: City of Tshwane, 2021

Figure 1.3 illustrates a Google map of the township of Hammanskraal, including the Temba area that forms part of Greater Hammanskraal.

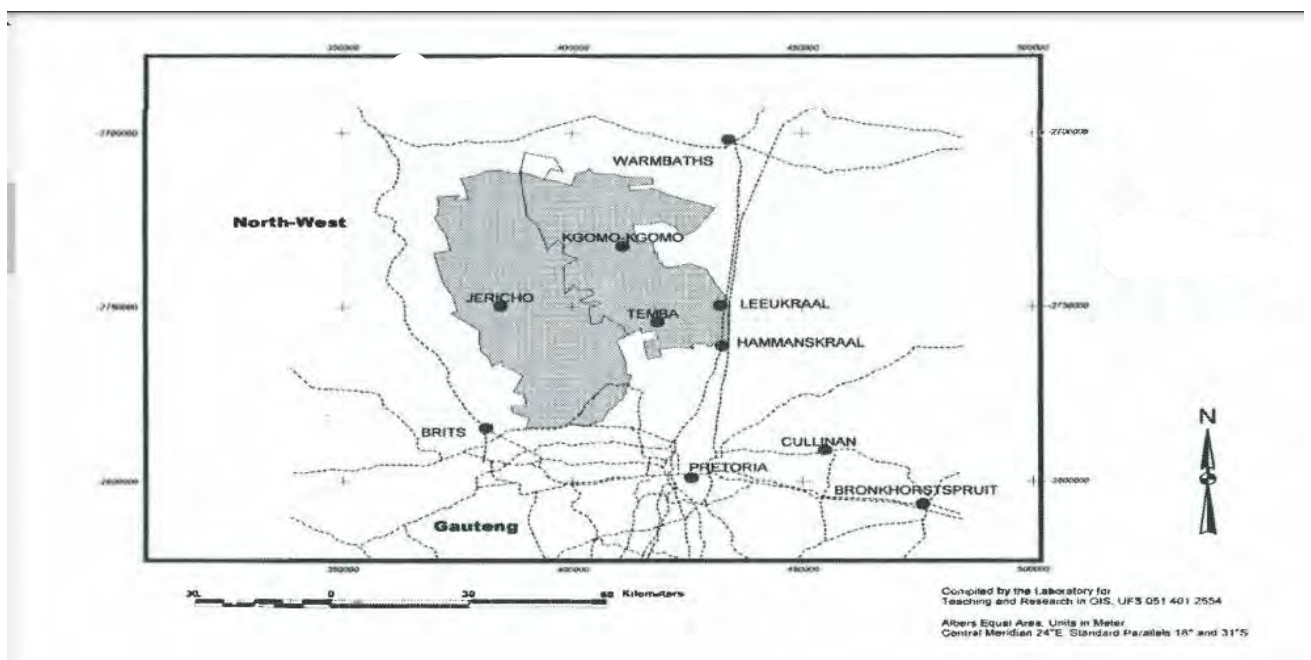


Figure 1.3: Map of Hammanskraal *Source: Municipal Demarcation Board, 2011*

Hammanskraal has a high rate of unemployment and low levels of service delivery (Mitchley, 2021a). The community services sector is the biggest employer in Hammanskraal, with a significant number of people employed in government programmes such as the Extended Public Works Programme (EPWP). The EPWP was launched in Hammanskraal in 2011 by the then Public Works Minister, Gwen Mahlangu-Nkabinde, in response to the severely low skills levels and high unemployment. According to the SA Government News Agency (2011) the majority of the participants in the EPWP are unemployed young people who do not have work experience.

With regard to governance, the City of Tshwane metropolitan municipality council consists of 214 members – 107 of whom are elected in wards and the other 107 through proportional representation from party lists. In the 2021 local government elections, the African National Congress (ANC), the governing party in South Africa, won 75 of the 214 seats while the biggest opposition party, the Democratic Alliance (DA), won 69 (Independent Electoral Commission, 2021). This meant that no party had an outright majority to govern the city, resulting in the formation of a coalition government that is led by the DA.

1.4.2. Temporal scope

The water insecurity challenges in Hammanskraal can be traced back to 2005 (Evans, 2021a, Mahlatsi, 2023). While the severity of the problem has escalated over the years, understanding the genesis of the crisis enables us to make sense of what factors and processes led to the rapid deterioration of the situation in the said township. This study examines water insecurity in Hammanskraal from 2005 leading and up to the cholera outbreak in 2023. This 18-year period, which occurred in the democratic dispensation in South Africa, has been marked by significant socio-political developments, including the change of political administrations in the City of Tshwane, from the African National Congress up to 2016, to successive Democratic Alliance-led multiparty governments from 2016 to present (2023).

1.5.ORGANISATION OF THE STUDY

This study is organised into seven chapters as follows:

Chapter 1: Study background and overview of the research

This chapter gives an overview of the introduction and background of the study. It outlines the problem statement, the research questions that guided the study, the aim and objectives of the study, significance and rationale of the study, the spatial and temporal scope of the study and outline of chapters.

Chapter 2: Conceptual and theoretical framework

This chapter highlights the theoretical framework underpinning the study. The literature review outlines the concept of water security, situating it in the context of the historical township of Hammanskraal and locating it within the broader water security and governance challenges in the City of Tshwane metropolitan municipality and South Africa broadly. This chapter also analyses some critical global and national frameworks pertaining to water security. Foundational legislation and frameworks are analysed. In addition to this, analysis is provided on existing legislation on water security in the City of Tshwane, the Gauteng Provincial Government, and the national Department of Water and Sanitation. These include the Constitution of the Republic of South Africa, (Act 108 of 1996); the National Water Act (Act 36 of 1998); the National Water Amendment Act (Act 27 of 2014); the National Water Policy of 1997; the National Water Resource Strategy Reports including the United Nations World Water Development Report are also analysed.

Chapter 3: Research methodology and design

This chapter gives an overview of the research methodology employed in this study. It outlines the research paradigm that was utilised, the research design and strategy, as well as the population and sampling design. It also outlines the methods of data collection and their instruments, and the data analysis utilised. Ethical considerations and limitations are also outlined.

Chapter 4: Water security challenges in Hammanskraal and their equity dimensions

This chapter outlines results of the study, obtained from interviews and observations, of the equity dimensions of the water security challenges in Hammanskraal. This chapter deals with interpretation and analysis of the data collected from interviews with residents of Hammanskraal, as well as interviews with officials from the City of Tshwane metropolitan municipality, the Gauteng Provincial Government and the South African Association of Public Administration and Management. It also incorporates data obtained from literature reviewed and provides an overview of the methods used in this data collection.

Chapter 5: Water security challenges in Hammanskraal and their governance drivers

This chapter outlines results of the study, obtained from interviews, participant observations and secondary data, of the governance drivers of water security challenges in Hammanskraal. In addition to this, data obtained from interviews with provincial and municipal government officials, as well as the South African Association of Public Administration and Management, is used to assess the state's experiences, interpretations and responses to the governance drivers of the water security challenges in Hammanskraal and the City of Tshwane broadly. The chapter also provides an overview of the methods used in this data collection.

Chapter 6: Summary of findings, recommendations and conclusion

This chapter provides a discussion of the data and conclusion of the study. It provides key recommendations on the resolution of the water security challenges in Hammanskraal, as well as suggestions for areas of further study. The chapter also provides a reflection on the limitations of the study.

CHAPTER 2: CONCEPTUAL AND THEORETICAL INSIGHTS OF WATER SECURITY

CHAPTER SUMMARY

In this chapter, conceptual and theoretical insights of water insecurity are analysed. These insights, which are embedded in South Africa's apartheid history and its impact on contemporary democratic society, lay the foundation on which the analysis of equity dimensions and governance drivers of water security challenges in the township of Hammanskraal, the case study of this research undertaking, is made. Critical to this analysis are the theories of water security that are outlined in this chapter. These theories are the nucleus on which perspectives on water insecurity are developed. The Malthusian theory proffers that water insecurity is the product of scarcity, as argued by Dinar *et al.* (2019) while the Marxist theory of conflict contends that water scarcity is a function of socially and economically constructed inequalities. The relevance of the latter theory in the context of this study is that it places structural and institutional constructs at the centre of water insecurity, corroborating the analysis of the study that poor governance and embedded inequities are a greater factor to water insecurity in South Africa than natural scarcity. The catastrophe theory, which is also analysed in this chapter, offers important insight on the impact of climate change on water resources. The theory is especially relevant in assessing water security and adaptation strategies in the context of environmental change. However, it has significant limitations in that it does not explain the water governance failures that even climatologists concur are a greater danger to South Africa's water challenges and lack of climate resilience than environmental change itself (Bega, 2021). The water justice theory provides an intersectional analysis of water insecurity in South Africa and is the cornerstone of analysis in this study. The literature engaged in this chapter demonstrates that while water scarcity tends to be presented as a natural phenomenon even by policy-makers, it stems from deeply political distributive choices. According to Venot and Clement (2013) and Boelens (2020) it is not nature but rather, social norms, policy agreements and scientific standards in water governance that have naturalised and normalised injustices and inequities pertaining to water access.

2.1. INTRODUCTION

In the year 2000, an important case was heard at the Durban High Court in the KwaZulu Natal Province of South Africa. The case was not only a Constitutional poser that tested the right to water in South Africa, but it would also ultimately set a precedence on the water security struggle in the country. The case is filed as *Manqele v Durban Transitional Metropolitan Council 2002(6) SA 423 (D & CLD) (Manqele)*.

Thulisile Manqele, a resident of the large township of Chartsworth in the south of Durban, was a working-class Black woman who, due to having no income, was unable to provide for seven children under her care. In addition to this, she was also unable to pay for the provision of water and electricity in her Council house. At the time of taking the case to court, she had a R10 000.00 water bill owing to the Durban Transitional Metropolitan Council. While the Council was providing 6 kilolitres of water per month to residents of Durban, the Manqele household, owing to its size, was exceeding this provision. In August of 1999, Manqele's electricity was cut off by the Durban Transitional Metropolitan Council and just a few months later, in 2000, the municipality also cut off her water supply. Without access to water, Manqele was forced to rely on the generosity of her neighbours, though this eventually created challenges for her as they were no longer willing to assist her owing to their rising water bills. Left with limited options, she resorted to collecting water from a water stream near her home. This too proved to be a challenge as the water was severely contaminated – as was the rainwater that she would collect during the wet season. Eventually, in June of 2000, Manqele approached the Durban High Court on an urgent basis to request that the municipality reconnect her water. Eight months later, in February 2001, the judge presiding over Manqele's case made a devastating ruling: the eThekweni Municipality was under no obligation to reconnect Manqele's water for as long as she was unable to pay for it.

The ruling in the *Manqele v Durban Transitional Metropolitan Council* was devastating both in the context of the struggle for the right to water in post-apartheid South Africa as well as the message it was sending out about how different arms of the state understood the issue of redress. But a significant outcome of the case was that it exposed the lack of synchronicity in South Africa's water legislation. According to Kotze (2009) Manqele based her claim of the unlawfulness of the cutting off of water supply to her household on Section 3 of the Water Services Act (No 108 of 1997, RSA 1997) rather than on Section 27 of the Constitution. And yet, even the section upon which she made her claim states: "Everyone has a right of access to basic water supply and basic sanitation...Every water services institution must take reasonable measures to realise these rights" (Section 3[1] and [2], Water Services Act, 1997). Furthermore, this law and the principles are derived from the Constitution.

And yet, it would seem that the interpretation of the right to water was inconsistent as evidenced in the case of *Bon Vista Mansions v Southern Metropolitan Local Council 2002 (6) BCLR 625 (W)*. In this particular case, residents of Bon Vista Mansions, a block of flats situated in Hillbrow in Johannesburg, brought an urgent application against the Southern Metropolitan Local Council, arguing that it had disconnected its water supply based on non-payment. The residents sought interim relief in the form of an order on the Southern Metropolitan Local Council to restore the water supply pending the final determination of an application for similar relief which was granted by Judge Budlender AJ. In contrast to the Manqele case, judge Budlender AJ found that “the disconnection of an existing water supply was prima facie in breach of the Council's constitutional duty to respect the right of access to water in that it deprived the applicants of existing access” (Dullah Omar Institute, 2023).

This same interpretation would also be applied in the case of *Mazibuko and Others v City of Johannesburg and Others (CCT 39/09) [2009] ZACC 28; 2010 (3) BCLR 239 (CC); 2010 (4) SA 1 (CC) (8 October 2009)*. In this case, the applicants, residents of the township of Soweto, challenged the then Department of Water Affairs and Forestry (DWAFF) as well as water services provider’s legislation and policies pertaining to water provision. In this case, the applicants were challenging the constitutionality of water meters that the City of Johannesburg Metropolitan Municipality had installed, which made water available to households based on a positive credit in their meter accounts (SAFLII, 2009). The Court found that the denial of water would perpetuate decades-long poverty and deprivation and the undignified existence of South Africa’s apartheid past (Kotze, 2009). It thus deemed denial of water provision as both unlawful and unconstitutional. Furthermore, it declared the installation of prepaid water meters as unconstitutional.

These cases are a window into the difficult road that South Africa has been on with regards to the struggle for water provision and by extension, water security. They are also an expression of the complexities of water governance. Water legislation and policies are the chromatin network of water governance. When the interpretation of this legislation is inconsistent, water governance is threatened. This study seeks to demonstrate several interlinked issues which are outlined in this chapter that provides conceptual and theoretical insights of water insecurity in South Africa. The first of these is that despite a Constitution that advances social and economic

rights and values, the water legislation and framework in South Africa is confronted with complex challenges (Iyer and Tewari, 2017). Part of this complexity, as illustrated in the beginning of the introduction, is the different interpretations of water law by the Courts. Additionally, there is also a lack of synchronicity between the prescripts of the law and their implementation by governments and water services providers. Iyer and Tewari (2017) posit that the developmental mandate of local government's responsibility in respect to giving effect to socio-economic rights, particularly the right to water, and safeguarding this right, does not always find concrete expression.

Another interlinked issue that is explored in the study is the legacy of apartheid that continues to impact issues of water access and provision. Tarantino (2019) contends that an examination of the economic ideologies of apartheid is the starting point in understanding the water security challenges confronting South Africa today. These sentiments are echoed by other scholars including Tempelhoff (2017) and Jegede and Shikwambane (2021) whose studies explore the link between water legislation under the apartheid regime and ongoing uneven access and water infrastructure development, affecting Black-dominated geographies in particular. It is for this reason that the township of Hammanskraal, the study area for this research, is an especially important case study. Equally important is assessing the efficacy of interventions made by the post-apartheid government in dealing with the historical legacy of water inequities that birthed water insecurity in Hammanskraal and other regions of South Africa. The following section explores theories of water insecurity.

2.2. THEORIES OF WATER SECURITY

Water security has emerged as one of the most important issues in the 21st century. In March of 2023, the *Global Water Security 2023 Assessment*, led by water experts at the United Nations Institute of Water, Environment and Health (UN INWEH), was released at the UN 2023 Water Conference. This report is different from others before it in that it evaluates the global water security status in a more comprehensive manner through the use of multiple but inter-linked dimensions. These include drinking water, sanitation, good health, water quality, water availability, water value, water governance, human safety, economic safety, and water resource stability (MacAlister *et al.*, 2023). According to the report, the majority of the world's population resides in water-insecure countries, with least developed countries and small island

developing states in particular facing severe water insecurity (MacAlister *et al.*, 2023). Countries in sub-Saharan Africa as well as the poorer islands of the Pacific are especially affected, while the most water-secure countries are largely from western Europe and Scandinavia.

The report identifies Sweden as the most water-secure country in the world, along with twenty-three other European countries. In the Asia Pacific region, only New Zealand, Australia, Cyprus, Malaysia, Kuwait, Japan and Israel are deemed as water-secure. In the Americas, which includes North and South America as well as the Caribbean, only Canada and the United States of America are deemed water-secure. The implication of this, according to the report, is that the physical availability of water resources does not inherently result in water security. This is evidenced in the fact that many countries in Asia-Pacific, Africa and the Americas have abundant freshwater resources and yet, also have the highest rates of deaths attributed to water, sanitation and hygiene due to limited access, poor water quality and poor water governance (MacAlister *et al.*, 2023). Sub-Saharan Africa is identified as the global region with the lowest levels of safe water, sanitation and hygiene services, which contributes to the region having the lowest levels of water security.

There are numerous theories of water security that are often used in policy development. According to Boelens (2020) many of these theories are rooted in neo-liberal knowledges of water that centre the issue of scarcity in the discourse. This approach is criticised as being devoid of an appreciation of existing power-relations in the context of water at both a global and a local level. This argument is corroborated by MacAlister *et al.* (2023) who contend that policy-makers, due to this orientation, are mainly focused on water scarcity mitigation – an approach which is argued to be reductionist in its interpretation of water insecurity. In South Africa, multiple and often contradictory theories of water are applied by the state. The various cases in which municipalities have been taken to court over the shutting off of water for residents, and the courts deeming such actions unlawful and even unconstitutional as illustrated in the case of *Mazibuko and Others v City of Johannesburg and Others (CCT 39/09) [2009] ZACC 28; 2010 (3) BCLR 239 (CC); 2010 (4) SA 1 (CC) (8 October 2009)* are an indication of not only different legal interpretation but also, different theoretical perspectives to water access. Whereas municipalities often employ an economistic approach that is anchored on the idea that

water is a commodity for which consumers must pay for access, the courts employ a constitutionalist approach that is anchored on the idea that water is a human right and must not be reduced to a commodity. Tempelhoff (2017) argues that the economic approach to water is rooted in South Africa's colonial and apartheid past where the water legislation passed by parliament was greatly influenced by industry, particularly the mining and agriculture sectors. However, even the democratic legislation on water recognises that water is an economic good. This is also a core principle in integrated water resource management (IWRM). This also exist in the National Water Act. So, the tenant of water as an economic good is consistent in both apartheid and democratic legislation. This is the basis for the difficult conversation on how to reconcile equity and human right to water with the economic principle of efficiency and long-term sustainability. This is not an easy task, both practically and intellectually.

This study demonstrates the simple and complex ways in which water governance is at the heart of the water security challenges in South Africa. And while governance is about making and enforcing decisions within institutions and society, it is also “the process of interactions through the laws, social norms, power or language as structured in communication of an organized society over a social system” (Bevir, 2012:27). The point about language and power is important in the context of water governance. Schreiner (2013) argues that this poor governance is the key reason why the National Water Act has been so difficult to implement in South Africa. Theorising water correctly is the foundation on which effective water policies can be developed. As such, it may be argued that South Africa's inconsistent water policies are the nucleus of its water security challenges. For this reason, it is important to problematise the dominant theories of water security not only because they result in the development of policies (Schreiner, 2013; Perreault, 2014) but also because “many of today's water dispossessions and unfair accumulation practices find their legitimization in discourses of efficiency and arguments of rationality” (Boelens, 2020: 208).

In the following section, four key theories of water security are explored. These are: the Malthusian theory (scarcity theory); the catastrophe theory; the conflict theory and the water justice theory. The applicability of these theories in the South African context is analysed.

2.2.1. Malthusian theory

The Malthusian theory of water scarcity is derived from the works of English economist, Thomas Malthus, who developed the idea that population growth is potentially exponential while the growth of the food supply or other resources is linear, which eventually reduces living standards to the point of triggering a population decline. According to Malthus (1798) due to population growth, human consumption will eventually exceed the availability of natural resources, causing negative social outcomes like war, disease, and famine.

The Malthusian theory of water scarcity contends that available freshwater is inversely proportional to Earth's population, thereby creating a deficiency in supply. This explanation of water scarcity, rooted in neo-classical economics, dominates the discourse and major policy concerns on water and security. Scholars such as Dinar *et al* (2019) have argued that with increased levels of water scarcity and its supply variability, there is concern about the ability of the planet to meet the growing demand for food for an exponentially increasing population, albeit with less available resources per capita. Linked to the Malthusian theory is the scarcity theory, which argues that there is supply-induced scarcity that is caused by the degradation and depletion of natural resources including water.

Proponents of the Malthusian theory of water scarcity in South Africa argue that a growing population is one of the key reasons for the country's water security challenges. As such, they draw a link between water insecurity and migration. According to Mnisi (2020) and The Water Project (2023a) rural-urban migration is placing pressure on urban water resources, making it difficult for cities to meet the growing demand for water. This debate is not restricted to South Africa. In the Middle East, refugees and migration have also been used as a scapegoat for water security challenges in cities. According to Middle East water researcher based at the University of Kassel in Germany, Hussam Hussein, the Syrian war that broke out in 2011 resulted in the influx of a quarter million Syrian refugees into cities in neighbouring Jordan (Reuters, 2019). Jordan is the world's second most water-scarce country, with annual renewable water resources amounting to less than 100 m³ per person, far below the threshold of 500 m³ per person which defines severe water scarcity (UNICEF, 2019). And yet, according to Hussein, statistically, the impact of refugees on water resources in Jordanian cities is negligible in comparison to the

unsustainable use of water, particularly in the agricultural sector, as well as the mismanagement of water resources, illegal wells/boreholes and leaks (Reuters, 2019).

While there is some basis in the argument that migration increases pressure on existing natural resources, this is not adequate to explain South Africa's water security challenges that are largely rooted in the country's geography and poor water governance. This is explained by Ziervogel (2018) who contends that the problem of water insecurity in urban areas is due to over-reliance on water from dams and rivers that are coming under strain due to, among other factors, poor water conservation strategies. Ziervogel (*ibid*) contends that a new urban design that is anchored on the integration of stormwater infrastructure and sustainable drainage systems must be explored if the urban water crisis is to be alleviated. She goes on to argue that while this new urban design is being explored, implementation has been rather slow due to "constraints on governments' and contactors' capacity to adopt new approaches and limited resources to pay for them" (Ziervogel, 2018: 181). Poor water governance is also at the centre of water challenges – an issue explored by Earth.Org (2020) in a study on how governments have orchestrated the global water crisis, which uses Cape Town as one of its case studies.

Proponents of critical theories of water security have also questioned the legitimacy of the Malthusian theory. Over a century after Malthus proposed his theory, Boserup (1993) argued that food production, linked to water availability, can and will rise to meet the demands of a growing population by means of technological change. It has also been argued that with the development of effective policies and strategies for the mitigation of water insecurity challenges, it is possible to alleviate water insecurity and simultaneously protect the natural environment (McNeill *et al*, 2017). Thus, the foundation on which the Malthusian theory of water scarcity rests is not absolute.

2.2.2. Catastrophe theory

One of the most notable theories of water security is the catastrophe theory. Catastrophe theory was developed by Rene Thorn and contained in his 1972 published *Stabilite Structurelle et Morphogenese*. In biology and the social sciences, catastrophe theory seeks to explain various forms of nature in a process of disruption. According to Zeeman (1976) the theory seeks to

make sense of the sudden transformations and unpredictable divergences that occur in nature, which call for functions that are not differentiable. In the context of water security, the catastrophe theory has been proposed “to explain transitions through discontinuities and unexpected changes in water system” (Xiao-jun *et al*, 2014). These unexpected changes in water systems are largely the function of climate change. The link between climate change and unexpected changes in water systems is one of the key studies at the Grantham Research Institute on Climate Change and the Environment. According to one of the researchers at the institute, the implications of climate change for water security range from large-scale shifts in the flows of transboundary river systems to disruptions to local unimproved water sources which include unprotected wells, springs and surface water. Furthermore, the changing patterns of extremes will also increase flood risk “with consequences for individual and community wellbeing through physical impacts and the psychological effects of risk exposure and trauma recovery” (Conway, 2023)

The catastrophe theory is popular with Chinese scholars such as Xiao-jun *et al* (2014) who contend that population, urbanisation and climate change have led to increase water shortages across the world. In their study where they use catastrophe theory to assess water security and adaptation strategy in the context of environmental change in the northwestern Chinese city of Yulin, the scholars contend that catastrophe theory based multi-criteria evaluation model is most effective in the assessment of water security under different management strategies and that through it, its application, it is possible to recommend the best water management strategy to achieve water security in the context of global environmental change. Other scholars such as Yang *et al* (2012) have also used the catastrophe theory in the assessment of urban water security. Using an evaluation method of catastrophe theory, the scholars developed a method for assessing urban water security in the Chinese city of Wuhan, the capital of central China’s Hubei Province.

In the context of South Africa, the catastrophe theory can be used to explain the human impact that has influenced the warming of the atmosphere, oceans and land and thereby contributed to climate change. Additionally, it can be used to explain the rapid changes in water systems resulting from droughts. In a study commissioned by the Intergovernmental Panel on Climate Change (IPCC), lead author, climatologist professor Francois Engelbrecht of the Global

Change Institute at the University of the Witwatersrand, contends that Day Zero drought in the Gauteng Province is the single biggest of four climate risks South Africa faced in the near term (quoted in Bega, 2021). The study argues that the exponential increase in drought events in the Gauteng Province is one of the most salient effects of climate change in Southern Africa – and that this will have a catastrophic effect on a province that is deemed the economic nerve-centre of the region. Professor Engelbrecht contends that drought events are going to result in dam levels being so low that they will not be able to provide the Gauteng Province with the water supply that it requires to sustain its industries (*ibid*). More concerningly, he posits that the province is not prepared for this potential catastrophe, reiterating the concerns of the South African Cities Network (2016) that municipalities across the Gauteng Province and South Africa broadly are not resilient to the impacts of climate change and that their water infrastructure will not withstand these impacts. This latter aspect reflects poor water governance more than it does the crisis of climate change. Thus, it can be argued that the catastrophe theory alone does not account for South Africa’s water security challenges as governance drivers are equally if not more important. The question may arise about whether we can achieve a resilient system if, for example, we were to strengthen the inter-basin water transfer schemes, from Lesotho, or implement a water reuse scheme on a wider scale. While these interventions may be helpful, in the absence of good governance at municipal and provincial level, the probability of efficacy is limited.

2.2.3. Conflict theory/Marxism

The conflict theory of water security is derived from the works of German economist, Karl Marx, who, in his seminal work, *Capital: A Critique of Political Economy*, contended that social relations are grounded in unequal power relations between those who sell their labour for a wage and those who own and control the means of production (Marx, 1887). Marx argued that this relationship inherently expresses conflict through two main contradictions. The first contradiction is that the capitalist class builds its wealth through surplus produce achieved on the backs of the working-class, which in turn is given exploitative wages and additionally, is alienated from the production process. The second contradiction is on the imbalances of organisation and ownership, with workers collectively organised in order to achieve production to which they have no ownership and no control. Conflict theory is thus concerned with the

unequal distribution of resources and power (Allan, 2006). This inequality and the complicated class structures that inform it is historical.

Marxist political theory views the commodification of water as an extension of the capitalist mode of production and the long reach of the market system into new spaces and social relations. Marx (1887) defined this as primitive accumulation. The main purpose of primitive accumulation is to privatise means of production including natural resources such as water. In the context of water resources, conflict is the result of the uneven distribution of water between developed and developing nations, as well as developed and underdeveloped regions within the same country/geography. In this regard, water scarcity is seen as a challenge not of scarcity but of unequal distribution that deepen class inequalities.

The relevance of the conflict theory in explaining water security challenges in South Africa is two-fold. Firstly, the theory explains the historical process of the uneven economic distribution of water, linking it to the country's colonial and apartheid history. Marx and Engels (2014: 11) contends that "the history of all hitherto existing society is the history of class struggles". This implies that prevailing material conditions in modern societies are informed by a history of class struggles which, in colonial societies, also have a racial character. The economic distribution of water in South Africa is an outcome of water services development and infrastructure (Tempelhoff, 2017). But it is not just a matter of distribution but also of ownership. According to the Water Act (No. 54 of 1956), water ownership was the preserve of those who owned the land. This meant that if a river flows through one's land, then that portion of the river belonged to them. If there was underground water beneath one's farm or land, that underground water it belonged to them. Considering that at the time of the implementation of this law, more than 80 percent of the land belonged to a White minority following centuries of land dispossession and annexation as a result of colonial conquest and apartheid, and land on which Black people lived was communal and in underdeveloped homelands (Ngcukaitobi, 2018), the implication was that only White people, living on arable land, had ownership of water. Scholars such as Berlanda (2017), Tempelhoff (2017), Jegede and Shikwambane (2021) have demonstrated that prevailing water security challenges in South Africa have their roots in the country's history of class and racial struggle which gave rise to water policies that

entrenched uneven development and segregation. This is elaborated upon in the latter sections of the literature review.

Secondly, the conflict theory explains the tensions water provision in South Africa. The seminal case of *Manqele v Durban Transitional Metropolitan Council 2002(6) SA 423 (D & CLD) (Manqele)* was rooted in these tensions. On the one hand, the right to water is enshrined in the Constitution of the Republic of South Africa. On the other hand, because the provision of water is linked to a prescribed minimum, water provision is often inadequate in households. Furthermore, while the right to basic water provision is fundamentally aimed at redressing historical inequities pertaining to water access (Langford and Kok), many poor households in South Africa continue to face challenges in accessing water due to their lack of resources. In a case review assessing the challenges and progress of water access in the post-apartheid dispensation, Heleba (2010) argues that the working poor may find it hard to prove they are indigent, resulting in them having to pay for water. But even when indigency can be proven, as with *Manqele*, there is no guarantee that it will be interpreted that way by both the courts and the municipal government. Boelens (2020) contends that in many countries, contemporary water policies and legislative measures have tended to exacerbate historically rooted inequalities rather than solving them. He contends that communities and individuals that are on the margins, such as working-class women like *Manqele*, are “constantly overruled by bureaucratic water administrations, market-driven water policies, desk-invented legislation and top-down project intervention practices” (Boelens, 2020: 207). The commodification of water aggravates tensions in water legislation and the practice of water provision and access.

2.2.4. Water justice theory

There is growing scholarship on the justice aspects of water, anchored on the synthesis that the governance of water is a socio-political, geo-political and economic question. On the basis of this synthesis, it is argued that “issues of sustainability and ecological integrity in water governance cannot be dealt with in isolation from questions of fairness, solidarity and justice” (Boelens, 2020: 207). The theory of water justice argues for ecological integrity in water governance and contends that the focus in terms of water security must be on its equity dimensions. Water justice proponents and scholars contend that the discourse on water justice “must be on the pressing societal problems of how rights and access to water and water-related

decision-making are distributed along lines of class, gender, caste and ethnicity” (*ibid*). Whereas other theories of water dominate policy and economic discourse within large institutions and complex frameworks, Zwaterveen *et al* (2005), Roth *et al* (2015) and Boelens (2020) and the theory of water justice is defined as a perspective that engages with the realities and questions of people on the margins, particularly the poor who are rendered voiceless and who do not enjoy representation on discussions about water access and security.

In the context of South Africa, the theory of water justice is particularly important as it aptly defines various challenges that the country is facing with regards to water. One of these is the inequities that characterise water. These inequities give rise to the questions guiding this research undertaking, as outlined in Chapter 1. In terms of participatory parity, it is important to understand who is on the table in decision-making on issues of water security in Hammanskraal and to what extent is the community involved in such processes. Additionally, it is important to understand what the extent to which Hammanskraal has water infrastructure in relation to more affluent suburbs in the City of Tshwane (and therefore, the distribution and burden of water insecurity within the municipality). And finally, it is important to understand the social, technological, economic, environment, political and historical context in which water insecurity occurs in Hammanskraal. Roth *et al* (2018) contend that understanding these equity dimensions of water security is crucial in understanding how water governance is a question of rights and representation. The theory of water justice underpins this study. This is because the theory of justice lend itself to equity – and the various dimensions of equity. In terms of distributive and contextual equity, the theory engages with intersectionality, providing an understanding of the complex intersection of class, race and geography as a function of colonialism and apartheid. This extends to recognition, which the theory explains in terms of historical context and contemporary challenges of reconciling water as an economic good and as a human right. The theory of water justice also centres the procedural equity dimension by engaging with the question of the fairness of the processes and procedures used to make decisions regarding water allocation and use. Equally important is that the theory of water justice also speaks to water governance. According to Boelens (2020) the theory contends that sustainability and ecological integrity are linked to equity and justice.

2.3. ORIGINS AND HISTORY OF WATER INSECURITY IN SOUTH AFRICA

The origins of water insecurity in South Africa must be understood within two contexts: the biological and political. These contexts are broadly accepted, with the National Water and Sanitation Master Plan stating that the country's water crisis is caused by "insufficient water infrastructure maintenance and investment, recurrent droughts driven by climatic variation, inequities in access to water and sanitation, deteriorating water quality, and a lack of skilled water engineers" (DWS, 2018: 2). At a biological level, the geography and topography of South Africa, much like that of Southern Africa, contributes to its water scarcity. South Africa is a water scarce country. It has an arid to semi-arid climate, with an average annual rainfall of 465 mm, which is just half the world average, with the current reliable yield of surface water at an acceptable assurance of supply being approximately 10 200 million m³/a at a national level (DWS, 2018). The limited supply of water is especially observable in the Gauteng Province. According to the Gauteng City Region Observatory (GCRO) in its study titled "Water Security Perspective for the Gauteng City-Region", the province has very limited local water resources and depends on supplies from systems that derive their water from five river basins across six provinces (GCRO, 2019). The climate that supports the supply from the said systems is "extremely variable with a history of unpredictable multi-year droughts" (GCRO, 2019: ii).

The political context of water insecurity in South Africa is linked to its history of uneven development and its contemporary water policies. The legislative framework that governs water access is explored in great detail in Chapter 3 of this study and provides a historical overview of the legislation that governed water during the apartheid dispensation. Needless to say, it has been argued that across the global South "contemporary water policies and legislative measures have tended to aggravate historically rooted inequalities rather than solving them" (Boelens, 2020: 207). This is true of South Africa where, according to Lahiff (2007), Schreiner (2013) and Tempelhoff (2017) water policies are failing as a result of their perpetuation of structural inequalities, including the prioritisation of water for commercial farmers over consumption for citizens.

The genesis of water infrastructure challenges can be traced back to the apartheid regime where policies of separate development resulted in minimal water infrastructure being provided in the former homelands (Jegede and Shikwambane, 2021). During the apartheid dispensation, there was no access to free basic water supply for disadvantaged populations. The existing legal framework did not recognise the water rights of Black, Indian and Coloured people in particular. According to Dollar *et al.* (2010) the Irrigation and Conservation of Water Act which was the main water legislation for a significant period of apartheid, prioritised the provision of water to the White farming communities in the agriculture sector. These farmers were granted riparian water rights that significantly limited and at times completely curtailed the water access of other populations. Tempelhoff (2017) argues that irrigation schemes that were intended to address social concerns made little difference due to the fact that their key focus was to ensure water provision for poor Whites at the expense of Black South Africans. Even in the 1960s when economic policy shifted towards industrial development rather than agriculture, water inequities persisted. According to Tempelhoff (2017) despite the regime's policy electing to use water for industrial development rather than agriculture as had been the practice over decades, Black people who moved to the cities to seek work as well those living in poverty in townships, did not receive necessary water services or infrastructure. Water infrastructure in particular was severely unevenly distributed and unevenly developed. According to the Department of Water Affairs and Forestry (2004a) water infrastructure in former homelands was underdeveloped due to the inefficient running of the homeland administration, the consequence of which was that in 1994, of the more than 30 percent of the population that lacked access to adequate water supply and 50 percent that lacked access to adequate sanitation, a significant proportion was located in the former homelands.

According to a study by Nnadozie (2011) which provides insight into water service and access demand in the democratic dispensation based on data from the 1996 and 2001 census as well as the national household survey from 1995 to 2006, the democratic government inherited a significant water access challenge in 1994. The study indicates that in 1994, only 6.6 million households in South Africa had access to piped water. Significantly, the backlog for water access was greater in provinces with the highest populations of Black people. KwaZulu Natal had the highest backlog, followed by the Eastern Cape and Limpopo, while the Western Cape, Gauteng and the Northern Cape had the lowest backlogs (Nnadozie, 2011). What is significant about this data is that it illustrates that provinces where homelands were located had the highest

backlogs (KwaZulu in KwaZulu Natal; Ciskei and Transkei in the Eastern Cape; Gazankulu in Limpopo) while historically industrial provinces that were part of South Africa (Western Cape and Gauteng) had the lowest backlog. Following the ushering in of a democratic dispensation, the national, provincial and local governments committed extensive resources to decreasing the backlog of piped water to South African households.

The quality of water infrastructure in the democratic dispensation is still reflective of apartheid spatial planning. The South African Cities Network (SACN) *State of Water in Cities* report indicates that historically industrialised provinces continue to have the highest proportion of the population with adequate water and sanitation. Conversely, rural provinces such as the Eastern Cape, KwaZulu Natal, Mpumalanga and Limpopo are lagging behind in terms of this infrastructure. This corroborates the findings of a study that states that “whereas apartheid has ended as an official state policy, the unfair discrimination which it typified to disadvantaged populations continues in the form of their lack of access to water in post-apartheid South Africa” (Jegede and Shikwambane, 2021). This lack of access is not only at a national level between provinces, but also at a local level within communities in the same municipality. This study demonstrates that the township of Hammanskraal which is located in the City of Tshwane metropolitan municipality experiences water insecurity challenges differently to how they are experienced not only by more affluent suburbs in the municipality, but also by different sections of the township itself, with informal settlements especially more affected by lack of basic water and sanitation. This is explored comprehensively in Chapters 4 and 5.

Despite the improvements in water provision, the quality of water to households is deteriorating owing, among other things, polluted run-off and untreated or poorly-treated being released into downstream communities (SACN, 2016: 7; DWS, 2023a). This is corroborated by data published by the South African government in the *2022/23 Blue Drop Watch Report*, according to which the quality of water in the country is particularly concerning. The report asserts that wastewater treatment works across many municipalities in South Africa are in a state of deterioration and there is a significant increase in the number of local authorities that are failing to meet minimum compliance standards (DWS, 2023b). Non-compliance by wastewater treatment works is flagged as a particularly salient challenge in the report, evidenced by the fact that in 2022, the Department of Water and Sanitation issued letters of non-compliance to

at least 244 wastewater treatment works across 205 municipalities, with only half of the municipalities responding to the department's concerns (DWS, 2023b). The department recognises that the impact of the ongoing deteriorating water quality is calamitous, arguing that it would require “a radical intervention by government to ensure that the required hardware, funds, competency, and chemicals are in place to supply safe water to consumers” (DWS, 2023: 511).

The findings of the *2022/23 Blue Drop Watch Report* are also echoed by the *Green Drop Watch Report 2023* which provides a technical assessment of the conditions of municipal wastewater conveyance and treatment systems in South Africa. According to this report, in 2022, all of the country's nine provinces and 334 municipal wastewater treatment works were identified to be in critical state, receiving Green Drop scores below 31 percent (DWS, 2023i). The report also goes on to state that “nationally, 172 of critical-state systems received regulatory and enforcement actions, ranging from cases reported, notices and directives issued, and criminal charges laid” (DWS, 2023i: vii). This accounts for 51 percent of all critical-state systems. The *Green Drop Watch Report 2023* identifies twelve factors that impact on turnaround, which include: lack of cooperation by municipalities, sewage losses before reaching treatment works, lack of capacity by Department of Water and Sanitation enforcement officials, and ongoing deterioration of infrastructure, processes and poor effluent quality (*ibid*). These factors in particular speak to the poor water governance that is widespread in South African municipalities which is echoed by the water department, stating that it notes with “deepened concern the delay, non-responsiveness, and poor quality CAPs by a notable number of municipalities” (DWS, 2023i: viii).

The poor water governance in South African municipalities is also illustrated in the *No Drop Watch Report 2023* which provides an overview on “the status of municipalities pertaining to their water losses, non-revenue water and water use efficiency against regulatory compliance and best management practices” (DWS, 2023j: iii). According to the report, there is a noticeable decrease in water loss management practices across most municipalities in the country, which has in turn resulted an increase in water loss trends. The report also indicates that infrastructure leakages have deteriorated consistently from 2016 to 2022, with the Infrastructure Leakage Index peaking at 6.4 in 2022, translating to Current Annual Real Losses (CARL) of 17 m³ /km

mains/day (DWS, 2023j: 9). This is an indication of poorly managed physical losses of water. But perhaps the greatest indictment on municipalities is expressed in the recommendations of the report, one of which states that a significant number of local municipalities are not aware of the reconciliation strategies at their disposal and as such, expect the Department of Water and Sanitation to provide the necessary funding to implement these strategies. The report states that municipalities “must be reminded of their responsibilities in terms of the Water Services Act (No. 108 of 1997) and actively participate, budget through the Integrated Development Planning process, and implement the results from the reconciliation strategies” (DWS, 2023j: 61). This statement implies lack of understanding on the part of local municipalities about what their responsibilities in terms of water infrastructure development as well as the policies on revenue and non-revenue water.

Poor infrastructure and lack of capacity by the Department of Water and Sanitation officials are not the only factors informing poor water governance in the democratic dispensation. Another salient issue is water policies that lack synchronicity and which, in some cases, are even deemed unconstitutional. One of the most controversial water policies that the democratic government made in an effort to collect revenue that would supposedly be used for the development and refurbishment of water infrastructure was the introduction of pre-paid water meters. Pre-paid water meters, which would later be declared unconstitutional by the Constitutional Court in the case of *Mazibuko and Others v City of Johannesburg and Others* (CCT 39/09) [2009] ZACC 28; 2010 (3) BCLR 239 (CC); 2010 (4) SA 1 (CC) (8 October 2009), were installed in many households. After provisioning free 6000 kilolitres of water per household, the meter would start to charge per litre of water consumed. Households would need to preload their meters in order to continue having access to water. Those households who did not have the means to pay for the water would go without as the water was automatically shut off when the basic provision was finished and the meter did not have any money for further use.

Antina von Schnitzler, in her seminal work titled *Democracy's Infrastructure: Techno-Politics and Protest after Apartheid* explores the conflicts surrounding prepaid water meters, focusing particularly on the township of Soweto where popular protests arose as a result of this water policy. Von Schnitzler (2017) contends that metered water access is a visceral remnant of the

apartheid system – that water meters and similar devices were first installed by the apartheid government to prevent Black people from having equal access to water. It is for this reason that water is a political question. She argues that “infrastructure, payment, and technical procedures become sites where citizenship is mediated and contested” (von Schnitzler, 2017: 38). This is echoed by Desai (2002) who argues that water has become a site of struggle in the post-apartheid dispensation, with the poor such as Manqele (whose story is elaborated upon in the introduction of this chapter) being subjected to apartheid-style bureaucracy that denies them the fundamental human right to water.

The challenges pertaining to water infrastructure and poor water governance are particularly concerning in light of the dire situation that South Africa finds itself in. According to a discussion published by ESI Africa, South Africa is on the verge of physical water scarcity by 2025 “where it is expected to experience a water deficit of 17 percent by 2030, and climate change will worsen the situation” (Roodbol, 2020). In the absence of refurbished and upgraded water infrastructure, as well as the ongoing poor water governance, South African municipalities do not have the necessary capacity for climate change resilience that is needed to navigate the ecological challenges that are already battering the country’s coastal regions.

Water legislation in South Africa has historically shaped and has been shaped by the country’s political economy. Water infrastructure and access was used by the apartheid regime to facilitate the segregationist policies that underpinned the idea of separate development (Tarantino, 2019). In his seminal study on water legislation in the first phase of apartheid, Tempelhoff (2017) contends that in the 20th century, the colonial and apartheid governments developed only two primary pieces of legislation related to water governance. Each of the two pieces of legislation passed by parliament laid down a primary definition of how the water resources of South Africa would be developed. He goes on to argue that “each was representative of a ground breaking shift in the way the state was governed” (Tempelhoff, 2017: 189). This is evidenced by the fact that the Irrigation and Conservation of Water Act, No. 8 of 1912 was adopted following the formation of the Union of South Africa that had occurred in 1910 and served to contribute to an enabling environment of appeasement by the parties that had united to form a unitary state. The next significant piece of water legislation would be adopted four decades later when the legislature promulgated the Water Act, No. 54 of 1956.

Tempelhoff (2017) argues that the primary long-term objective of this legislation was to ensure that there was a sufficient supply of water to support South Africa's growing social, economic and industrial development, particularly in the mining industry that was a backbone of the apartheid economy.

An important point to note about the Water Act, No. 54 of 1956 is that it was adopted in the first decade of the National Party rule, with its introduction coinciding with the apartheid government's policy of separate development. Tempelhoff (2017: 192) contends that during this period, water resources were focused on meeting the needs of the rapidly urbanising apartheid cities as well as regional development in catchment areas and as such, the Act was aimed at ensuring available water resources were only delivered to areas where the government believed it could be used most effectively. Even as the apartheid government had no role in the provision of public water and sanitation (Hattingh *et al.*, 2007) this was particularly pronounced in townships and rural areas where Black people lived. It is for this reason that at the end of apartheid in 1994, despite the democratic government inheriting highly functional access to water supply and sanitation services (Busari and Jackson, 2006) these were unequal and reflected the racialised patterns of segregation and spatial development that characterised the apartheid regime.

The next significant primary pieces of water legislation in South Africa were developed and adopted in the post-apartheid dispensation. The first was the Water Services Act, No. 109 of 1997, which was followed by the National Water Act, No. 39 of 1998. These two pieces of water legislation differed radically from the previous two in both substance and orientation. Whereas water legislation under apartheid was largely geared towards industrial development, in the democratic dispensation, water was seen as a tool for redress. This is explained aptly by Tempelhoff who states that "the content and intent of the new acts were significantly different from all previous water legislation in that the prime principles were now equity for all water users and the need for the government to act as custodian of the resources on behalf of all the country's people" (Tempelhoff, 2017: 193). Furthermore, water legislation in the democratic dispensation also seeks to move towards sustainable development, though empirical evidence suggests that this is an uphill battle.

2.4. WATER POLICIES AND LEGISLATIVE FRAMEWORKS IN SOUTH AFRICA

South Africa's transition from apartheid to democracy resulted in the country's reintegration into the international community where it had been excluded due to sanctions against the National Party government. These sanctions were applied in the mid-1980s and were intended to put pressure on the regime to release political prisoners and bring an end to the system of apartheid (Levy, 1999). And although the effectiveness of sanctions has been debated, with scholars such as Hufbauer *et al.* (1990) and Morgan and Schwebach (1997) arguing that their success was minimal and is often overstated, and others such as Hoffenberg (1995) and Jordan (2013) contending that they played a crucial role in the defeat of apartheid, what they were able to do was isolate apartheid South Africa and prevent its participation in international bodies such as the United Nations.

Following the end of apartheid, South Africa has since become a signatory to international protocols, frameworks and policies that centred human rights – including the right to water access. These include the United Nations Sustainable Development Goals (SDGs), the International Convention on the Elimination of All forms of Discrimination against Women (CEDAW), the Draft Protocol to the African Charter on the Rights of Women and the Guidelines on the Right to Water in Africa. The latter was adopted by the African Union Commission through the Working Group on Economic, Social and Cultural Rights, which was mandated to develop principles and guidelines on the right to water with the aim of assisting the Commission's member states in the implementation of their water access and governance obligations (ACHPR, 2019). The Draft Protocol to the African Charter on the Rights of Women obligates member states of the African Union to “provide women with access to clean drinking water, sources of domestic fuel, land, and the means of producing nutritious food, and establish adequate systems of supply and storage to ensure food security” (African Union, 2003:9). The International Convention on the Elimination of All forms of Discrimination against Women notes specifically the right of women in rural areas to enjoy adequate living conditions, particularly as it relates to access to sanitation and sufficient water supply. Commitment 2 of the Copenhagen Declaration on Social Development (United Nations, 1995), which speaks to the eradication of poverty through national actions and international cooperation, commits to the provision of safe drinking water and sanitation. And while the Universal Declaration of Human Rights (UDHR), the International Covenant on Economic, Social and Cultural Rights

(ICESCR) and the African Charter on Human and Peoples Rights do not speak directly to the issue of water, they draw an important link between water security, food security, the environment, housing and health.

The principles that govern these protocols and agreements, specifically the principles of non-discrimination and equality, serve as a foundation for South Africa's constitutional and legislative framework on access to sufficient water. According to Jedge and Shikwambane (2021) when it comes to domestic legislation on water access, South African courts, in their interpretation of legislation, may prefer to employ any reasonable interpretation that conforms with international law. In the following section, key pieces of water legislation, frameworks and programmes in South Africa are analysed.

2.4.1. The Constitution of the Republic of South Africa Act 108 of 1996

Since the end of apartheid in 1994, South Africa has been a constitutional democracy. The Constitution of the Republic of South Africa Act 108 of 1996 is the supreme law of the land. The principles of the Constitution inform legislation – in spirit and in law. The spirit of the Constitution is anchored on its aim to redress injustices of the past by establishing a legal regime that redresses the legacy of the draconian laws of the colonial and apartheid regimes that governed South Africa before 1994. This is not dissimilar to the basis of constitutionalism in other African countries. According to the Constitutional Court (2021), nearly all constitutional processes on the African continent emanated from the struggles for independence. They were preceded by struggles against racial domination and colonialism. According to the Constitutional Court (2021) “the quest for democracy, self-determination and human rights forms the backdrop to many modern African constitutions”, precisely because these principles were denied to Black African majorities by former (colonial)regimes. South Africa's quest for democracy and human rights is a product of the experiences of the country's amoral past and the aim of the country's prevailing laws is to redress the injustices of this past (Mahlatsi, 2022a) and fashion a more equitable and just nation.

Before the constitutional dispensation of 1996, South African society was characterised by colossal disparities with respect to the provision of basic services such as water and sanitation.

The laws governing water were shaped by the National Party's bias to industries, particularly agriculture. According to Tempelhoff (2017) because a significant portion of the party's support base was in the agricultural sector, the government was compelled to prioritise the needs of White commercial farmers. Priority was also given to industrial development (Davies *et al.*, 1976), particularly in the former Orange Free State where the manufacturing and mining sectors were booming.. All this focus on industry and in areas where White people resided meant that the Black majority was denied access to water. This is congruent with the fact that spatial planning was at the heart of colonialism and apartheid (Mahlatsi, 2022) and as such, because Black people were geographically disenfranchised, it also meant that their ability to access water was significantly impacted. It is for this reason that access to water became enshrined in the constitution of the new South Africa.

The right of access to adequate water is accorded to everyone in Section 27(1)(b) of the Constitution. This section, which address healthcare, food, water and social security, states that everyone has the right to have access to sufficient water. Section 27(2) goes on to state that the state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of this right. The right to water is regarded as a second generation right. These are defined as rights that are connected to the social and economic features of life (Constitutional Court of South Africa, 2023). Vasak (1977), quoted in Makhanya (2019) second generation rights are “socio-economic rights mainly compelling government to meet or create conditions for the fulfilment of some basic needs to enhance human dignity...These require the government to affirmatively provide social-economic necessities such as shelter, health, clean water, education and social infrastructure”.

It is important to note that the right of access to sufficient water in the constitution should be understood to mean that the state is under no obligation to provide water without charge. However, it is under obligation to create mechanisms that enable people to have access to sufficient water. According to the South African Human Rights Commission (2000) in the event of resource constraints, which limit the ability of the state to fulfil its obligations, the state is still obliged to provide a plan of action that demonstrates that the full realisation of the right will be achieved over time. It is also important to note that while it may not be obliged to provide water freely, the state must still ensure the protection of indigent persons in so far as

their access to clean drinking water. This is expressed in the National Framework for Municipal Indigent Policies (Department of Provincial and Local Government, 2012) which is complemented by the *Free Basic Water Strategy and Guideline* as well as the *Free Basic Sanitation Strategy and Guideline*, and according to which indigent households must receive a stipulated amount of free water and sanitation services.

Another important section of the Constitution that necessitates mention is Section 24(a), according to which everyone has the right to an environment that is not harmful to their health or wellbeing. Section 24(b) goes further to state that everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures. According to Section 24(b)(iii) these measures must secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. This section speaks to the issue of the use of water, a natural resource, to promote not just economic development but also social development. It is especially important in the context of Hammanskraal where water resources are not protected. This is outlined in Chapter 5 of this study, with illustrations of the unhealthy state of the Apies River and the Leeukraal Dam, critical catchments that play an important role in the water system of Hammanskraal and the City of Tshwane broadly.

2.4.2. National Water Act, Act No 36 of 1998

The former president of the Republic of South Africa, Nelson Mandela, assented to the National Water Act 36 of 1998 in August of 1998, after which it was gazetted. The Act, one of the most comprehensive in the country, was developed with the aim of providing for the fundamental reform of the law relating to South Africa's water resources, as well as to repeal the previously existing water laws. According to Schreiner (2013) the Water Act No 54 of 1956 was not only racially discriminatory in terms of who could access water or how it was allocated but was based on the legislation of continental Europe which had an abundance of water, and as such, was not appropriate for a water-scarce country such as South Africa. The National Water Act 36 of 1998 thus sought to repeal the following previously existing laws: the Waterval River Act 34 of 1968, the Water Rationalisation and Amendment Act 32 of 1994, the Water Amendment Act 51 of 1995, and the Water Amendment Act 58 of 1997. The National Water Act 36 of 1998 is anchored on three key principles: equity, sustainability and efficiency. It aims to “protect,

use, develop, conserve, manage and control water resources as a whole, promoting the integrated management of water resources with the participation of all stakeholders” (Department of Water Affairs and Forestry, 1999: 3).

To appreciate the principles that underpin the Act, it is important to understand that it was developed soon after the transition into a democratic dispensation during which the primary objective of the government was to redress injustices of the previous regime. It is for this reason that in its preamble, the Act recognises that “while water is a natural resource that belongs to all the people, the discriminatory laws and practices of the past have prevented equal access to water, and use of water resources” (*National Water Act 36 of 1998*). This is a recognition of the legacy of uneven development that had defined the apartheid dispensation. According to Jegede and Shikwambane (2021) this uneven development extended to both water access and water infrastructure, which was skewed along racial and geographical lines, with Black people in rural areas in particular being on the receiving end of underdeveloped water infrastructure and insufficient water resources. The Act thus seeks to address the question of equitable access and distribution in order to cement the over-arching principle of equality that is affirmed by the Constitution.

The principle of sustainability is also highlighted in the preamble of the Act, which states that “the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users” and further that “the protection of the quality of water resources is necessary to ensure sustainability of the nation’s water resources in the interests of all water users” (*National Water Act 36 of 1998*). The Act, acknowledging that the National Government has the overall responsibility for and authority over the nation’s water resources and their use, also contends that the government must also be responsible for the equitable allocation of water for beneficial use. This indicates that even for purposes of development, which is beneficial to the country, sustainability must still be pursued. Sustainable development is “an approach to development that looks to balance different, and often competing, needs against an awareness of the environmental, social, and economic limitations we face as a society” (Sustainable Development Commission, 2017). In the context of water resources, the competing needs pertain to water being used for industrial purposes in sectors such as agriculture, mining and manufacturing – versus being used for consumption and survival by ordinary people of South

Africa. The Act seeks to balance these competing interests, while placing sustainability at the centre.

The last principle on which the Act is anchored is that of efficiency. The efficient use of the country's water resources is dependent on, among other factors, water management strategies. This is why the Act recognises "the need for the integrated management of all aspects of water resources and, where appropriate, the delegation of management functions to a regional or catchment level" (*National Water Act 36 of 1998*). Part two of chapter two of the Act outlines the catchment management strategies, while chapter seven outlines the catchment management agencies. These strategies also deal with water governance. The Act stipulates that all catchment management agencies (CMAs) must progressively develop a catchment management strategy for the water resources that are within their water management area. It further gives guidance on what the catchment management strategies must include, specifically, a water allocation plan as well as principles for the allocation of water to existing and prospective users. Significantly, the Act also stipulates that the catchment management strategies must undergo constant review. This is especially important because as the population increases and water resources become more constrained, there must be evolved management strategies that take into account the management and control of this finite resource. However, establishing CMAs have been difficult, with only two fully established and functional in the country.

Despite its progressiveness, which is evidenced by its centring of principles of equity and sustainability, the National Water Act 36 of 1998 has been very difficult to implement. Reflecting on the Act fifteen years after its implementation, the Former Deputy Director-General: Policy and Regulation of the Department of Water Affairs and former chair of the Water Research Commission, Barbara Schreiner, posits that there are significant aspects of the Act where implementation has been inadequate. These include re-allocation and equity, the licencing of water use and the protection of aquatic ecosystems. In respect to equity, Schreiner (2013) contends that a decade and a half after the implementation of the Act, there was little achievement in terms of water allocation reform, resulting in historically disenfranchised communities still battling with water access while White commercial farmers remained the biggest users of South Africa's freshwater resources. She further argues that the process of

issuing licences to water users was met with significant challenges which resulted in delays, impacting on economic growth in the country (*ibid*). In addition to this, despite South African scientists developing internationally recognised methodologies for determining water requirements of aquatic ecosystems, achieving these requirements has been very difficult and the country's aquatic ecosystems remain under threat from various factors including but not limited to pollution. This is corroborated by the Department of Water and Sanitation (2023f) in the *National State of Water Report 2022* which states that South Africa's rivers and dams have a very serious problem of microbial contamination from faecal pollutants, and that the deterioration of the country's rivers and dams is worsening over time.

Other factors informing the challenges with implementing the National Water Act 36 of 1998 include institutional arrangements and the impact of leadership, transformation and the change of power. Schreiner (2013) argues that the transfer of power to a democratic government which was tasked with transforming society and the highly segmented labour market resulted had an impact within the then Department of Water Affairs and Forestry. She contends that during the apartheid era, the department had been largely technical, with the scientists, engineers and lawyers being predominantly White men. This changed after 1994 where, in line with employment equity, many Black people, particularly women, were appointed into the department. She contends that while this was necessary for the purposes of transformation, the unintended consequence was the outflow of the White workers who had technical expertise, in whose place a number of people were appointed who had limited technical training or experience in the water sector due to the legacy of apartheid that resulted in poor education and training outcomes for Black people in particular (Schreiner, 2013). She goes on to argue that this resulted in the transfer of skills from the Department of Water Affairs and Forestry to the private sector consulting community, where many of the White skilled workers had gone. This increased the dependence of the department on consultants to support the implementation of the new policy and legislation, even as the under-skilled civil servants were tasked with the actual implementation (*ibid*). Schreiner also reflected on the political-administrative interface, arguing that it created instabilities within the department, impeding on the implementation of the Act.

2.4.3. National Water Resource Strategy

The first National Water Resource Strategy, referred to as NWRS1, was published in September 2004 and was succeeded by the second edition, the NWRS2 eight years later in August 2012. The second edition of the NWRS was developed in alignment with the National Water Act 36 of 1998 and the National Development Plan (NDP) imperatives that support sustainable development (DWS, 2013: iii). The NWRS2 (2013) has three following core objectives. The first is to ensure that water supports development and the elimination of poverty and inequality. The second is to ensure that water contributes to the economy and job creation. And the third is to ensure that water is protected, used, developed, conserved, managed and controlled sustainably and equitably. The NWRS2 aims to achieve these outlined objectives through two broad complementary strategies – Resource Directed Measures (RDMs) and Source Directed Controls (SDCs). The latter is achieved through the use of the Water Allocation Reform Programme (WAR). The WAR was developed with the purpose of taking necessary steps to meet the water needs of historically disadvantaged individuals and the poor; ensuring participation by historically disadvantaged individuals in water resource management; promoting the sustainable use of water resources; and promoting the beneficial and efficient use of water in the public interest (Department of Water and Sanitation, 2023g). Amongst the interventions of the programme is the provision of financial and technical support to resource poor farmers, as outlined in the *Policy on Financial Assistance to Resource Poor Irrigation Farmers* (Department of Water Affairs and Forestry, 2004b). In addition to this, general authorisations will be facilitated. General authorisations effectively permit the Department of Water and Sanitation to authorise large numbers of people to take up water without the need for obtaining a licence. Other proposed mechanisms include water set aside specifically for redress, development support and partnerships that will ensure that water is availed to previously disadvantaged groups.

In alignment with these objectives, the NWRS2 recognises the necessity of augmenting existing water resources as these are not adequate for supporting South Africa’s developmental objectives. The strategy makes a commitment that “the country will thus consider other potential sources, which include water re-use, desalination, groundwater utilisation, water conservation and water demand management measures, rain water harvesting, recovering water from acid mine drainage, and the import of water intensive goods” (DWS, 2013: iii) as a means of supplying the great demand for water for the purpose of equitable allocation for development and economic growth.

2.4.4. National Water Resources Infrastructure Agency Bill

The state of South Africa's water and sanitation infrastructure is deeply concerning. According to Zhuwakinyu (2012) and Meissner and du Plessis (2022a), while the country has made headway in the expansion of water and sanitation infrastructure since the mid-1990s, many areas are beginning to see deterioration. Du Plessis (2022a) posits that this deterioration of water and sanitation infrastructure is attributed to under-investment in infrastructure maintenance and chronic delays in the renewal of old infrastructure. She goes on to contend that other factors informing the deterioration of water and sanitation infrastructure include "poor management, limited budgets, poor revenue management by local municipalities, misappropriation of funds, lack of capacity or necessary technical skills related to water services and sanitation operation and maintenance" (du Plessis, 2022a). According to Masindi and Dunker (2016) another contributing factor is the low quality of the materials that are used in the development of water infrastructure and sanitation facilities, which results in the infrastructure failing to reach the end-point of its design life. A study on the state of water in cities by the South African Cities Network (2016) indicates that South Africa has one of the highest levels of impoundments of water infrastructure in the world.

In addition to the water security challenges raised, there has also been concern raised about water governance in South Africa. Specifically, the Auditor-General, in her report on the audit outcomes of the country's nine water boards, namely: Rand Water, Bloem Water, Magalies Water Board, Mhlathuze Water Board, Lepelle Northern Water, Umgeni Water, Amatola Water, Overberg Water and Sedibeng Water, for the financial period of 2021 and 2022, noted that only four of the water boards achieved a substantial number of their planned targets (Auditor-General, 2022). In addition to this, the report contends that there is a lack of proper coordination between the Department of Water and Sanitation and the water boards to "drive the consistent formulation and reporting of key performance objectives as set out in the National Water and Sanitation Master Plan" (*ibid*, 2022: 4). The report also identified material errors in the annual performance reports of the majority of the water boards. Although four of the water boards were able to make corrections to the financial statements to achieve unqualified opinions, the report noted that "poorly prepared financial statements and significant activity to make corrections in response to the audit means that leadership makes financial decisions throughout

the year based on financial information that is not credible” (*ibid*, 2022: 21). The report evaluated the root causes for internal control deficiencies identified in the audits for seven of the water boards, with the exception of Magalies Water and Overberg Water as they received clean audits. These were stated as, among other things, inadequate preventative controls to prevent non-compliance with procurement legislation and ineffective development, implementation and monitoring of audit action plans (*ibid*: 2022: 29).

It was on the basis of these multiple concerns that the South African government made a determination that an agency dedicated to water resource infrastructure would be established. Subsequently, the draft bill for the establishment of the National Water Resource Infrastructure Agency was gazetted on the 16th of September 2022 by the Minister of Water and Sanitation, Mr Senzo Mchunu. The aim of the bill is:

“To provide for the incorporation and establishment of the South African National Water Resources Infrastructure Agency Limited as a state-owned company and major public entity owned and controlled by the State to administer, fund, finance, provide, operate, maintain and provide advisory services in respect of national water resources infrastructure in accordance with sections 10, 11, 24, 27(1)(b) and 27(2) of the Constitution and national policy; to provide for the transfer of assets and certain liabilities to the South African National Water Resources Infrastructure Agency Limited from the Department of Water and Sanitation and from the Trans-Caledon Tunnel Authority; to provide for the disestablishment of the Trans-Caledon Tunnel Authority; and to provide for matters connected therewith.”

(Department of Water and Sanitation, 2022: 139)

The draft bill was sent out for public comment on the 16th of September – a process that was supposed to conclude on the 14th of December 2022. However, several stakeholders requested an extension and it was granted by the Minister of Water and Sanitation, extending the public comment deadline to the 17th of March 2023 (Odendaal, 2023). As such, as of June 2023, the bill is yet to be adopted into law. While the bill could ensure the synchronisation of policies and programmes aimed at ensuring water security in South Africa, the perilous state of SOEs in the country, combined with the long-standing failure to implement the NWA, is cause for concern.

CHAPTER 3: RESEARCH METHODOLOGY AND DESIGN

CHAPTER SUMMARY

This chapter provides an overview of the research methodology that was used in this study. It outlined the research philosophy or paradigm, research design, research strategy, population and sampling design. It also outlines the methods of data collection and their instruments, as well as the data analysis that was utilised. The choice of the methods and instruments that were used in the study is informed by the research approach that underpins it, which is qualitative. This was the most relevant and useful approach to analyse the equity dimensions and governance drivers of water insecurity challenges in Hammanskraal. Face-to-face interviews that were conducted with the residents of Hammanskraal and government officials in the provincial and local state provided depth to the study, particularly as the residents were interviewed within their communities where they felt most comfortable and familiar. This enabled them to be more open. The semi-structured interviews enabled the participants to provide additional information and reflections that added to the depth of the data. Ethical considerations, which are outlined in this chapter, were adhered to throughout the data collection process. The researcher explains the study in detail and participants were informed of their rights in the study, including the right to withdraw their voluntary consent without fear that such a decision could disadvantage them in any way, or carry any ramifications. Participants were all competent to participate in the study and had decision-making capacity. Furthermore, the researcher ensured that no harm was done to the participants or the information that they provided. Validity and reliability, two critical aspects in research, were detailed and this illustrated the extent to which scientific rigour was embedded in the study.

3.1. INTRODUCTION

Exploratory research seeks to explore specific questions in order to gain better understanding of an issue; explanatory research seeks to identify the causal relationship between two or more variables; and descriptive research seeks to describe phenomena (Pratap, 2019). This research study is explanatory in nature, as it seeks to explain the causal relationship between equity dimensions and governance drivers in the challenge of water insecurity in Hammanskraal.

3.2. RESEARCH PARADIGN/PHILOSOPHY

According to Kuhn (1970) a research paradigm is a set of common beliefs and agreements shared between scientists about how problems should be understood and addressed. Kuhn argues that research paradigms must contain “universally recognized scientific achievements that, **for a time**, provide model problems and solutions for a community of researchers” [emphasis by the researcher]. By highlighting that these scientific achievements provide model problems and solutions for a time, Kuhn is arguing that both knowledge and inquiry are in a constant state of evolution. This means that the problems that scholars identify at one time might later be resolved, and that the solutions applicable in a particular space and time might not be applicable at a later space and time. Thus, the paradigms employed bear relevance only in so far as they respond to the prevailing model problems and solutions. This, however, does not imply an absence of scientific rigour, which underpins all research undertakings.

Researchers argued that paradigms must address five specific issues, as outlined in Figure 3.1: “(a) what is to be observed and scrutinised (b) the kind of questions that are supposed to be asked and probed for answers in relation to this subject (c) how these questions are to be structured (d) how the results of scientific investigations should be interpreted (e) how an experiment is to be conducted, and what equipment is available to conduct the experiment” (Perera, 2018:6). Critical to a research paradigm is how scientists respond to questions pertaining to ontology, epistemology and methodology (Guba and Lincoln, 1988). These questions are outlined below:

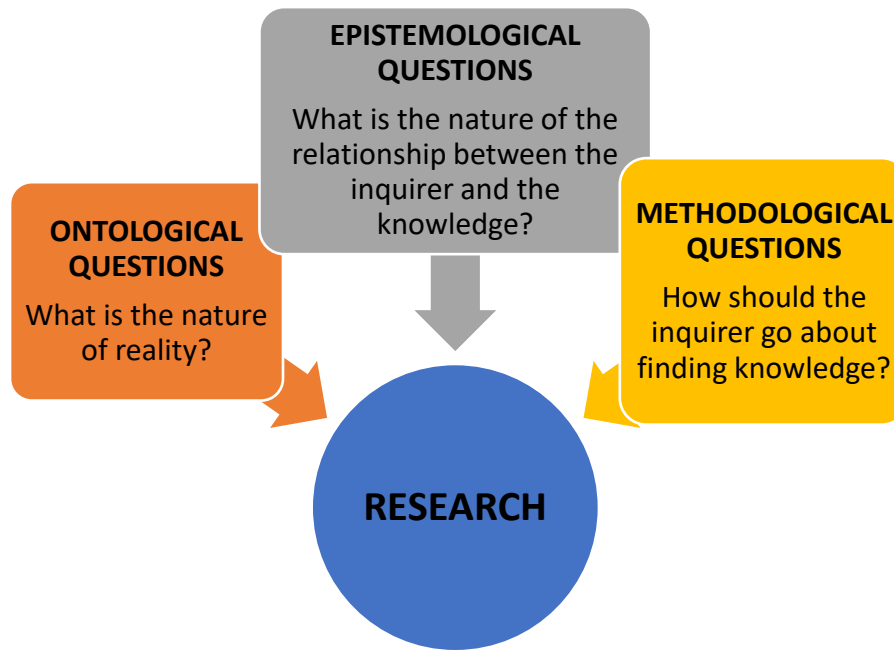


Figure 3.1: Basic questions of a research paradigm

Source: Perera (2018:8)

According to Busetto *et al.* (2020), qualitative methods are most relevant in research that assesses complex multi-component interventions and systems of change, which seek to answer the whom, how and why questions. A qualitative approach is used in this study, to understand the experiences, ideas, meanings and interpretations of the equity dimensions and governance drivers of water security challenges in Hammanskraal (Babbie, 2001). In this approach, researchers are fundamentally embracing the idea of multiple realities and conduct a study with the intent of reporting these realities (Creswell, 2012). According to Busetto *et al.* (2020), qualitative research is characterised by openness and responsiveness to context. It is for this reason that this approach is used in this study which seeks to make sense of the historical and contemporary complexities of the construction of the apartheid and post-apartheid city, and their impact on vulnerable communities.

3.3. RESEARCH DESIGN

The framework of techniques and methods that a researcher chooses to employ are known as the research design. This is effectively the “plan and procedure for research that spans the decisions from broad assumptions to detailed methods of data collection and analysis” (Creswell, 2009:3). According to Kumar (2014), deciding on a research design is crucial to any

research undertaking, as this directs the researcher to findings which ultimately lead to valid and credible conclusions. It is important that a researcher opts for a design which minimises data bias. Thus, while nearly all research, both qualitative and quantitative, has its own degree of error, a research design that is most appropriate is one that has the lowest margin of error. There are three research approaches, namely qualitative, quantitative and mixed-method. As this research is qualitative, it will employ an explanatory research design. Explanatory research is an approach that is used to discover details about why a phenomenon occurs. According to Indeed (2023) it can serve as a starting point for more in-depth studies. Due to the limitations of data on the equity dimensions of water security challenges in South African townships, and particularly in Hammanskraal, as outlined in Chapter 1, explanatory research is most appropriate for this study as it is a method for finding details in areas with small amounts of information. The scarcity of data on the subject of equity dimensions and governance drivers of water security challenges in Hammanskraal necessitates the development of foundational data, which this research aims to provide. This data was obtained through primary and secondary sources, with the former being particularly important as the interviews and participant observations provided real-life experiences and interpretations of the water security challenges in Hammanskraal from those who are affected. Of significance in the decision to use explanatory research for this study is that this kind of research approach provides researchers with opportunities to research the subject or related subjects further. By outlining the nature of the problem of equity dimensions and governance drivers of water security challenges in Hammanskraal, this research enables further research into related subjects such as the impact of inequities on women or other marginal groups, the impact of water security challenges on social relations and other topics as outlined and recommended for further study in Chapter 6.

3.4. POPULATION

In research, population is defined as “the object of research and consists, among others of individuals, groups, organisations, human products and events that share the same characteristics and represent the whole or total of cases involved in a study” (Fox and Bayat, 2007:52). Individual objects within the research population usually have common characteristics or traits. This means that when one is studying a particular phenomenon, their population tends to have at least one characteristic in common. This may be that they are all

students, even as they may be in different institutions; or that variants of a virus are different even as their host (mammals) is common or the epidemiology of the virus is one. The population is thus the group from which the researcher seeks to obtain information that will enable a generalised result of the study (Salkind, 2017). In this study, the population was the residents of Hammanskraal. Some of the common characteristics that they shared that make them a population include that they reside in the same geographic area.

3.5. SAMPLING

A sample is basically a subset of the population defined in the study. As researchers do not have the time and material resources to study all individuals within a chosen population, they define a sample that is representative and from which a credible statistical analysis can be drawn. Bhandari (2020) posits that with a credible statistical analysis, a researcher is able to use the sample data to make hypotheses about a population. Table 3.1 below outlines the qualitative sample that was used in this study.

Table 3.1: Qualitative data sample size

SN	Description of study elements	Frequency (f)	Percentage frequency (%)
1	Residents of Hammanskraal	10	50%
2	Government officials	8	40%
3	Non-state actors	2	10%
	Total number of participants	20	100%

The selection of participants for the study was done with the assistance of the former Zonal Chairperson of Hammanskraal, whose work within the greater Hammanskraal community spans over a decade. The participants were chosen based on their residency in the township. The two non-state actors, namely the South African Association of Public Administration and Management (SAAPAM) and the Tshwane University of Technology (TUT) were chosen based on their research on the administration and management of the City of Tshwane metropolitan municipality. SAAPAM is a think-tank that brings together public administration and management scholars as well as national, provincial and local government practitioners. The

TUT Soshanguve campus is located in the township of Soshanguve which is right next to Hammanskraal. The public administration and management scholars at the institution are thus best placed to opine on the political governance (and by extension, water governance) challenges confronting the City of Tshwane metropolitan municipality. You should also describe briefly the kind of government actors here

Qualitative research seeks to capture explanations, experiences and meanings about phenomena, rather than statistical data. Thus, while the sample size of 20 that is used in this study may be relatively small in comparison to the population size of Hammanskraal, it does not compromise the depth and richness of the data that was required to respond to the overarching question defined in the study. This is because although the sample is small, by selecting individuals from across locations within Hammanskraal, they provide depth. Furthermore, by interviewing diverse government officials and using different data collection techniques, one was able to triangulate.

3.6. DATA COLLECTION AND PROCEDURES

The data collection methods adopted in this study are discussed below:

3.6.1. Interviews

In this study, physical and telephonic interviews were conducted. Physical interviews, also known as face-to-face interviews, are an important instrument for data collection in explanatory research. These interviews are conducted “in order to understand other persons’ constructions of reality, we would do well to ask them [...] and to ask them in such a way that they can tell us in their terms [...] and in a depth which addresses the rich context that is the substance of their meanings” (Jones, 1985:46). According to Clark *et al.* (2003) these types of interviews, which can take the form of individual, face-to-face verbal interchanges or face-to-face group interviews, require the researcher to engage in person with the participants. Telephonic interviews were used due to the geographic location of one participant being inaccessible, and the busy schedule of another participant, who could not commit concretely to a physical interview. Table 3.2 outlines the interview schedule for physical interviews while Table 3.3 outlines the interview schedule for telephonic interviews.

Table 3.2: Interview schedule (physical)

Participant no	Date of interview	Interviewee	Location of interview
HAMMANSKRAAL			
A and B	22 March 2023	Residents	Hammanskraal
C, D and E	23 March 2023	Residents	Hammanskraal
F and G	24 March 2023	Residents	Hammanskraal
H	25 March 2023	Resident	Hammanskraal
I and J	28 March 2023	Residents	Hammanskraal
CITY OF TSHWANE METROPOLITAN MUNICIPALITY			
K, L and M	26-28 May 2023	Ward councillors	Hammanskraal
N	17 May 2023	Official in the Department of Water and Sanitation	Pretoria
O and P	18 and 19 April 2023	Officials in the Department of Water and Sanitation	Pretoria
GAUTENG PROVINCIAL GOVERNMENT			
Q	5 April 2023	Director: Department of Human Settlements and Infrastructure Development	Johannesburg
R	13 April 2023	Director: Department of Cooperative Governance and Traditional Affairs	Johannesburg

Participants were given the questions that they were to be asked by the researcher prior to the interview taking place (Annexure H). The questions and the study were comprehensively

explained to them before their consent to participate in the study was sought. Their confidentiality was assured, and they were informed of their rights in the study, specifically the right to withdraw from the study at any point without facing any adverse consequences. The recorded average time for the interviews was approximately one hour and thirty minutes per research participant. The interview questions were divided into two categories. The first set of questions probed the research participants about their experiences of water security challenges and the second set were designed to elicit responses about equity dimensions with a focus on how the water security challenges affected people, how people respond to these challenges, as well as their participation in decision making.

Table 3.3: Interview schedule (telephonic)

Participant no	Date of interview	Interviewee	Medium of interview
NON-STATE ACTORS: SOUTH AFRICAN ASSOCIATION OF PUBLIC ADMINISTRATION AND MANAGEMENT (SAAPAM) AND TSHWANE UNIVERSITY OF TECHNOLOGY (TUT)			
S	20 May 2023	Executive Director: SAAPAM	Telephone
T	23 March 2023	Lecturer: Department of Public Administration	Telephone

As with the physical interviews, participants were given the questions that they were to be asked by the researcher prior to the interview taking place. The questions and the study were comprehensively explained to them before their consent to participate in the study was sought. Their confidentiality was assured, and they were informed of their rights in the study, specifically the right to withdraw from the study at any point without facing any adverse consequences. The recorded average time for the interviews was approximately forty-five minutes.

3.6.2. Community meetings

According to Trainor (2018) while it may not be an established research methodology, implementing community conversation embodies many elements commonly found in qualitative research. Following the cholera outbreak in Hammanskraal, the national Department of Water and Sanitation, the Gauteng Provincial Government and the City of Tshwane metropolitan municipality held various meetings between mid-May and mid-June 2023 with the community of Hammanskraal, to explain the progress of the state in the provision of clean drinking water and the restoration of water services in general. With permission from the ward councillors in the different communities, the interviewer attended a community meeting on the 28th of May 2023 at Mandela Hall located at the Hammanskraal Community Centre. The aim of attending this meeting was to observe the interactions between the state and the residents of Hammanskraal. This data was obtained through observation.

3.7. DATA ANALYSIS

Qualitative data analysis is subjective in nature and employs inductive reasoning (Leedy and Ormrod, 2010). According to Wassertheil-Smoller, as cited in Bradford (2017), in inductive reasoning, researchers make numerous observations, discern a pattern, make a generalisation, and from that, infer an explanation or a theory. In this study, qualitative data was analysed through the use of content analysis. Content analysis interprets written, oral and visual data. According to Elo and Kyngas (2008), it is used to develop a model that best describes phenomena in a conceptual form and can be used in both an inductive and deductive context. This model is illustrated in Figure 3.2 below.

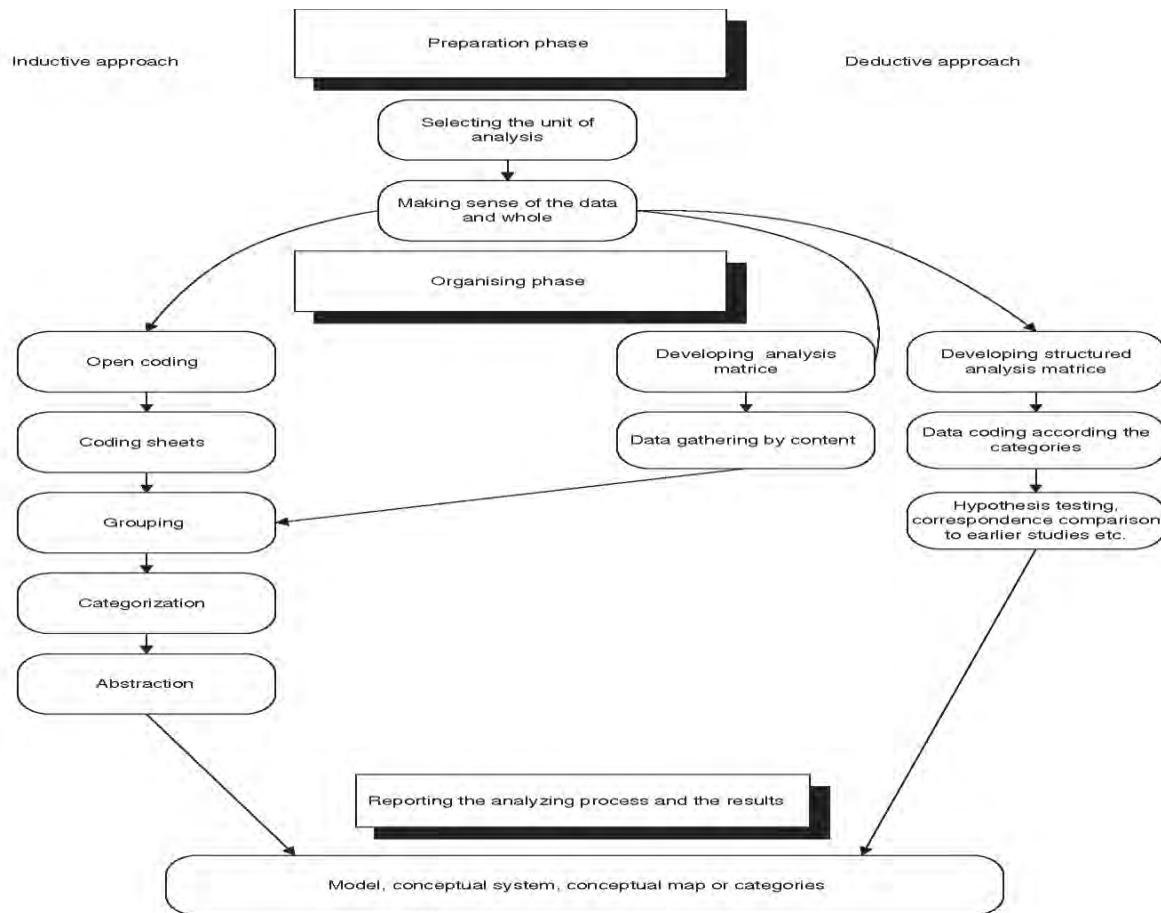


Figure 3.2: Preparation, Organising and resulting phases in the content analysis process used in this study. *Source: Elo and Kyngas (2012:110)*

Figure 3.2 shows the steps that are taken in inductive content analysis. The purpose of this study is to analyse the equity dimensions and governance drivers of water security challenges in Hammanskraal in the City of Tshwane metropolitan municipality. As argued in the introductory chapter, information on this subject, specifically in relation to the township under study, is scant. As such, inductive content analysis is most appropriate. According to Elo and Kyngas (2012), inductive content analysis is used when there is insufficient information about the phenomenon being studied. It is for this reason that a critical component of content analysis is engaging with extensive literature and familiarising oneself with essential themes that are derived from the coding process. Gibbs (2007) defines coding as the way a researcher defines what the data they are analysing is about and linking that data to the research idea. Due to the insufficiency of scholarship on the water security challenges in Hammanskraal, for this study, the researcher had to make numerous observations, discern a pattern, make a generalisation,

and from that, infer an explanation of what, why and how the equity dimensions of water security challenges express themselves in the said township.

3.8. VALIDITY AND RELIABILITY

In qualitative research, validity refers to “the ability or the potential of the data collection tool to capture and measure the phenomenon that the researcher is interested in measuring” (Pajo, 2018:121). The Merriam-Webster dictionary explains it further by stating that it is “the state of being well grounded or justifiable, relevant, meaningful, logical, confirming to accepted principles or the quality of being sound, just, and well founded” (Merriam-Webster, 2016). For this study, validity was achieved through the use of an appropriate research design and data collection instruments, namely interviews and participant observation. These enabled the gathering of comprehensive primary data which enriched the study and provided in-depth information on the phenomenon under study.

Reliability in quantitative research refers to “the ability of the testing instrument to produce similar results when administered to the same set of participants over time” (Mtotywa, 2019:29). While this is the accepted definition of reliability, it may not be applicable in the context of qualitative research. Various scholars including Morse (1991); Winter (2000); Merriam and Leahy (2005); and Cypress (2017) argue that the qualitative method cannot employ ability for replication and repeatability as a measure of reliability due to the fact that human behaviours, beliefs, experiences and interactions are in a constant state of evolution and subject to differences. In qualitative research, reliability must thus be based on “consistency and care in the application of research practices, which are reflected in the visibility of research practices, analysis, and conclusions, reflected in an open account that remains mindful of the partiality and limits of the research findings” (Davies and Dodd, 2002: 286). In this study, research practices were carefully and consistently applied, and conclusions arrived at were based on the application of these practices.

3.9. ETHICAL CONSIDERATIONS

Approval to conduct this research was granted by the Rhodes University Human Research Ethics Committee (RU-HREC), with approval number 2023-7103-7491 (Annexure I). Approval to conduct research in the City of Tshwane, Gauteng Province, was granted by the Gauteng Member of the Executive Committee (MEC) of Human Settlements and Infrastructure Development (Annexure C). According to Salkind (2017) the most important principle in research ethics is that where human subjects are involved in a study, their dignity must be protected at all times. This was achieved through adhering to the ethical guidelines as defined by the university, specifically as outlined in the *Research Ethics Policy: Research Involving Human Participants* and the Rhodes University Student Disciplinary Code. The ethical principles that guided this research are as follows:

3.9.1. Voluntary participation

In adhering to these ethical demands, the researcher ensured that before interviewing participants, a comprehensive explanation of the research study was provided in order that consent could be given on the basis of full knowledge of the research study, including its aims and objectives. In addition to this, a cover letter was provided to participants, detailing what the study is about as well as outlining their rights as voluntary participant (Annexure B). Written consent, through the signing of the participant informed consent document, was sought, as was permission to record and/or take notes of the interview.

3.9.2. Informed consent

The four fundamental principles of consent are competency, decision making capacity, documentation of consent and disclosure (Wagner, 2020). Participants were provided with an information sheet in order to understand what they were agreeing to participate in. Through this, the subject of disclosure was addressed. The researcher also provided further clarity on questions that were not thoroughly understood, and where possible, in the native languages of the participants. Finally, documentation was obtained through written notes in cases where participants did not consent to being recorded.

3.9.3. Confidentiality

Confidentiality is the cornerstone of basic principles of ethics in research and is one of the crucial ways in which participants can be protected. According to Polonski (2004), confidentiality means that even when the participants are known to the researcher, their identities must not be revealed in any way in the research report.. In the information sheet provided to participants prior to the interviews taking place, it was clearly stated that confidentiality would be maintained. One of the ways in which this was done was to ensure that the names, residential addresses and any identification markers of the participants would not be used. Symbols and numbers would be used to identify them.

3.9.4. Protection from harm

. To ensure that participants were comfortable during the interview process, all interviews took place in settings chosen by the participants. The questions asked did not seek information that could create legal problems for participants, and the researcher took great care to not ask questions that could cause psychological harm. Participants were also informed that they could opt to not respond to any question that they deemed harmful to their mental and emotional health. Additionally, participants were advised of the availability of free mental health services through the South African Depression and Anxiety Group (SADAG). This was done as, according to Polonski (2014: 63) one possible way to address the harm in such a project would be to provide participants with information on counselling services or appropriate support bodies dealing with the issue.

3.9.5. Communicating results

The information sheet explained how participants would be provided feedback. It also included the contact details of the supervisor in order that participants could engage with him with regard to any issues ranging from clarity-seeking to complaints.

CHAPTER 4: WATER SECURITY CHALLENGES IN HAMMANSKRAAL AND THEIR EQUITY DIMENSIONS

CHAPTER SUMMARY

This chapter presents data on the equity dimensions of water security challenges and responds to the first two objectives of this study as outlined in Chapter 1. The first objective is **to analyse how and why water insecurity has manifested in Hammanskraal, City of Tshwane** and the second objective of the study is **to assess the equity dimensions of water insecurity in Hammanskraal, City of Tshwane**. Data is obtained from interviews with residents of Hammanskraal including ward councillors, officials from the Department of Water and Sanitation in the City of Tshwane Metropolitan Municipality, an official in the Gauteng Department of Human Settlements and Infrastructure Development, an official in the Gauteng Department of Cooperative Governance and Traditional Affairs (CoGTA), a lecturer in the Department of Public Administration at the Tshwane University of Technology (TUT) and the Executive Director of the South African Association of Public Administration and Management (SAAPAM). Common among all these individuals is that they possess an in-depth understanding of the history and experiences of water security challenges in Hammanskraal. While some are affected by the water security challenges, some are at the proximal end of water policy development and implementation in the local and provincial state. Data from observations done by the researcher in Hammanskraal is also provided. These observations were made in communities across the various sections of Hammanskraal.

4.1. INTRODUCTION

A dynamic that is peculiar in Hammanskraal is that the degrees of water access differs dramatically within the same township. While some households have access to tap water, taps in some households are completely dry. In some cases, this happens within a 2 km radius. A similar situation found expression the early 2000s in the township of Nkobongo, about 40 kms north of eThekweni (Durban) in the KwaZulu Natal Province. There too, water and sanitation services were supplied unevenly within the same township, with water being provided to some households but not others, and refuse being collected from the low-cost houses but not neighbouring shacks (Tolsi, 2006). There too, a cholera outbreak occurred as a result. Not too far from Hammanskraal, in the peri-urban areas in the region of Moretele in the North West Province, there is also an uneven distribution and provision of water, with areas such as Makapanstad and Ngobi still relying on groundwater as their main water source, while some

parts of Carousel View receive reliable reticulated water supply from both the City of Tshwane and the Moretele Local Municipality (Sepeng, 2019). In Hammanskraal, this situation was highlighted by Rafapa (2020) in his investigative work on the governance drivers of water insecurity in Mogolego Village in the north-west of Hammanskraal, which found that at some points, residents in Ward 11 of the area had water coming from their taps (though this was short-lived as their taps ultimately ran dry) while those in Ward 12 had water from tankers supplied by the municipality. These disparities are also seen in the capacity for resilience within the township. While some residents are able to obtain alternative sources of water in the form of store-bought bottled water and water delivered to their domestic water storage tanks, many residents do not have this option. This was especially pronounced during the cholera outbreak. According to Tshikalange (2023) while some residents stopped drinking tap water due to fears that it was the source of the cholera bacteria, others continued to drink it as they had no other sources of water. A resident of Carousel View, a village just north of Temba, is quoted as saying the following:

“At my home, there is no income. I can't afford to buy water. It's only my child's social grant income of R500. What will we use to buy water and how will we boil when we have to also pay for electricity?” (Tshikalange, 2023)

And while the situation might have been worsened during the cholera outbreak, it had been going on for much longer. According to Obuseng (2019) reporting for the South African Broadcasting Corporation (SABC), in the summer of 2019, a transformer servicing the Temba Water Waste Treatment Plants was struck by lightning, resulting in severe water shortages in Greater Hammanskraal. Weeks after the damage to the transformer, it had not been repaired and the City of Tshwane had resorted to providing water through tankers. However, this water supply was insufficient and could not meet the needs of the community. Without any alternative to accessing clean drinking water due to socio-economic challenges, residents of Hammanskraal began to dig wells across the township using any tools available to them (*ibid*). Despite their unsuitability for the task, the residents' desperation for a water source resulted in them using garden pick-axes, garden trowels, garden forks and shovels to dig these wells. This was despite the fact that a study by geologists at the University of Pretoria on these wells in the west of Hammanskraal had found that they contained high bacterial counts. According to Baloyi and Diamond (2019) the wells and boreholes that were sampled in Refentse (formerly

Stinkwater) were found to contain dangerously high levels of nitrates, fluoride and coliform bacteria including *E. coli*. The study (*ibid*) found that the problem in Refentse was similar to that of Temba in that while the City of Tshwane and the Magalies Water board supplied water to some households, it was insufficient and was generally not drunk due to concerns about its colour, taste and odour, compelling the digging of private boreholes and wells.

It has already been established that the township of Hammanskraal has had water insecurity challenges for nearly two decades. These challenges have been intensifying as the years pass, and in May 2023, culminated in the devastating cholera outbreak which, by early July, had claimed 23 casualties (Sobuwa, 2023). Across the township, generations of people have had experiences with water challenges – from elderly people who lived in the area when it was part of the former Bophuthatswana homeland to varying generations of people born in the new dispensation. It is not incorrect to state that many young people born in Hammanskraal in the era of democracy do not have an experience of functional and consistent water provision from successive governments in the City of Tshwane metropolitan municipality.

While different political parties have sought to lay the blame for the problem at each other's door (see Mahlali, 2023; and Goba, 2023a) the residents of Hammanskraal have paid a heavy price. Those who perished in the May 2023 cholera outbreak paid the ultimate price. But these were not the only casualties – deaths from issues related to water have been reported for many years. Exactly a decade ago, residents of Steve Biko village just north-east of Temba in Greater Hammanskraal, went on a protest after being without water for over two months. While the lack of water provision was the root cause of the protest, the catalyst that led to it were the deaths of three children who had died after being hit by cars, in separate incidents, while fetching water from a nearby river (Masilela, 2023).

The impact of the water security challenges in Hammanskraal on the day-to-day lives of the residents have been deeply profound. These are explored in-depth in the next chapter. In the following section, data on the experiences that residents of Hammanskraal are details. In addition to this, the pollution of Apies River, which has a direct impact on the quality of water

in Hammanskraal, is illustrated. Ten individuals from households spread across the length and breadth of Hammanskraal were interviewed for this research study.

4.2. METHODS OF DATA COLLECTION

Three methods of data collection were used to obtain data on the equity dimensions of water security challenges in Hammanskraal. These methods include interviews with residents of the said township as well as various government officials across three tiers of government (national, provincial and local). In addition to interviews, for which the schedule is provided in Chapter 3, there was also direct observation in Hammanskraal. This included attending a community meeting aimed at addressing the water crisis following the outbreak of cholera, to assess the nature of engagement between government officials and residents of Hammanskraal. Finally, secondary data in the form of newspaper articles, academic text and reports from the national, provincial and municipal (local) government was used to glean information on the barometer of the historical and contemporary water inequities in Hammanskraal.

4.3. RESULTS

4.3.1 THE EXPERIENCE OF WATER SECURITY CHALLENGES IN HAMMANSKRAAL

As argued in the previous section, while the water security challenges in Hammanskraal are universal, there are particularities based on geography, which informs the institution responsible for water provision. To gain a broad appreciation of the situation, residents in households across different sections of Hammanskraal were interviewed. From these interviews, three master themes emerged that are explored below.

Intermittent availability of clean drinking water

For this study, all the interviews with residents of Hammanskraal took place in the month of March. As the middle of the said month marks the beginning of the Autumn season, it has historically been moderately cold and windy. However, the year 2023 saw one of the warmest March months in the Gauteng Province, resulting in prolonged warm temperatures, particularly in the northern region of Tshwane where the township of Hammanskraal is located. The

prolonged warm weather posed some challenges for the residents of the said township. Some of the residents who participated in this study raised a concern that the warm temperatures necessitated more consumption of water, which could not be accessed easily. The water quality in Hammanskraal had deteriorated to such an extent that within weeks of the conclusion of the interviews, the township would be the epicentre of the worst cholera pandemic in post-apartheid South Africa.

Residents of Hammanskraal who participated in this research study regard the water insecurity challenges in their township as the most pressing problem confronting them today. Resident J, a middle-aged woman who runs a small spaza shop in the Kanana section of Hammanskraal, stated that lack of water availability is even more devastating than the township's high unemployment rate due to the fact that it has a greater impact on capacity for livelihood generation as well as health outcomes of the residents. She stated that the lack of a reliable supply of water, which has worsened over the years, has negatively impacted her small business that relies on water for food preparation. The result of this has been that she spends most of her profits purchasing water from retailers, which has diminished her spending power and ability to grow the business. She had to let go of two full-time employees as the decrease in the profit margin meant she was unable to sustain the payment of salaries and related overheads.

Resident F, who lives in the Ramotse section, is a parent to a toddler and stated that the lack of water availability was especially worrying for her as her children relied on water for formula milk. Resident G, who lives in Tamboville, has a 7-year-old child. She indicated that her sole source of income is the child support grant (CSG) that is provided by the Department of Social Development through the South African Social Security Agency (SASSA). Her application for the Social Relief of Distress (SRD) grant, a monthly amount of R350 or \$18.3 U.S dollars, which is provided by the government to unemployed South African citizens, refugees and asylum seekers, was not successful. The CSG is not enough to cover all her child's basic needs, let alone buy much-needed clean drinking water for the household. She stated that although the City of Tshwane has, for years, been providing additional water at specific water points, with the use of water trucks, the allocation is not sufficient for her household's consumption needs. She argues that this was not always the case. According to her, a few years ago, the water provision was adequate, but the growing population in Hammanskraal has placed a heavy

burden on water supplied by the municipality, resulting in rationing that is leading to shortages in households like hers. She survives by re-using as much water as she can, as well as collecting rainwater to use for flushing the toilet and doing some of the laundry.

A recurring argument that was posed by residents across Hammanskraal is that the crisis of water availability did not begin spontaneously but rather, has been many years in the making. According to the ten participants who are residents of the township, all of whom have resided in Hammanskraal for over 15 years, the problems with water availability began in the mid-2000s. At the time, clean drinking water was available from their taps, for the most part. The start of the water challenges was not initially alarming. There would be scheduled water infrastructure maintenance every few months, which would result in water being unavailable for hours at a time. In some instances, the water would be turned off for a few days. However, within a year or two, the scheduled maintenances became more sporadic. This was especially the case in areas in east and central Hammanskraal. Residents A and D, who live in this part of the township, stated that during this period, they would travel to the far-east of Hammanskraal, in Rens Town, a middle-density area where water was usually available. Here, they would bring large containers transported with wheelbarrows, to collect water from relatives and friends. Resident C, who also lived in central Hammanskraal, stated that during the early days, she was able to buy water from the store as she was gainfully employed. Furthermore, as the water shortages, though sporadic, did not last for too long, she could make do with what was stored in containers. But by 2007/2008, the water availability challenges had become much more pronounced and weeks would go on without any water.

Resident H, who resides in Carousel View just north-east of Temba, stated that in the said community, water availability has historically been uneven, with formal settlements in the area having better availability than informal settlements even as they are in the same location. He attributed this to infrastructure disparities within the area, as well as the fact that some of the informal settlements have not been regularised by the City of Tshwane. The problem with lack of regularisation is that the municipality does not dedicate a budget to unregularised areas. Furthermore, they lack the most basic water and sanitation services as they do not have bulk infrastructure owing to the fact that such settlements were not planned but are often the result of illegal occupation of land. Resident H resides in an informal area of the township, and

contends that here, water unavailability has been worsening over time. He states that there were two community taps where residents could access water, but these have since been turned off. As a result, some residents still continue to collect water from rivers and streams on the outskirts of the township.

An important point that all participants made was that when water began to be intermittently available, there was a sense that this was a short-term problem that would be resolved within a reasonable amount of time. However, it had become clear by around 2009/2010 that the situation was far from short-term. In response to this, those with sufficient means began to install domestic water storage facilities in the form of JoJo tanks within their yards as illustrated in Figure 4.1. According to Makro, a retail store that sells JoJo tanks, the tanks are made from base polyethylene with pigment anti-oxidants and ultra-violet stabilisers and have a lifespan in excess of 20 years.



Figure 4.1: House with domestic water storage tank

Figure 4.1. illustrates the domestic water storage tank that resident C installed in her home a few years after the intermittent availability of water began. While these domestic water storage

tanks are extremely helpful for the storage of water and for irrigation purposes, they are not without their own challenges. Resident C stated that at the time when hers was installed, the concept of water storage tanks in townships was still new, and as such, workmanship on her initial tank was poor. In addition to this, water stored in the tanks cannot be consumed directly as it is not safe for drinking due to its source, which is mainly rainwater and, in her case, it would sometimes be tap water when it was available, which at some point, had deteriorated in quality. This caution is also made by JoJo tank manufacturers and retailers, who, in the product details of the tanks, state the following:

“...If in emergencies you need to drink the water from the Tank, it must be purified. The best way to purify small amount of water is to bring it to a rolling boil for a minimum of one minute, thereafter it will be fit for human consumption...”

But while resident C could mitigate against the loss of access to clean drinking water by purchasing a water storage tank, for many of the participants, this option was not available to them due to a lack of resources. This remains the case today. A 5250 litre vertical water tank, which is the one commonly used for domestic water storage, retails for R5 599.00 or \$293 U.S dollars, which is beyond the realm of affordability for most residents in Hammanskraal and all but two of the participants interviewed in this study who reside in Hammanskraal.

Rapidly deteriorating water quality

The participants in this study, across all sections of Hammanskraal, stated that the water quality in the township has been deteriorating over the years – in some areas at a faster pace than in others. According to participants B and D, who are residing in Temba, the rate of deterioration in this part of the township has been especially severe. They contended that it was for this reason that it did not come as a surprise to them that many of the cholera cases and deaths in 2023 were reported in this section of Hammanskraal. The residents of Temba stated that their area was the first one to experience poor water quality, many years before the problem spread through the rest of the township. According to resident B, as far back as 2008/2009, the water coming out of the tap at her household did had an unpleasant taste. She likened the taste to a mild detergent. Other participants stated that the first signs of deteriorating water quality was the colour of the water, which had gone from colourless to having a tint of brown in it. This is

illustrated in Figure 4.2. Resident A, who lives in Mandela Village in central Hammanskraal, stated that initially, the brownish water did not have any odour, but later started having a significant amount of thread-like particles and exhibiting a foul odour. At this point, people in the area began to invest in domestic water storage tanks.



Figure 4.2: Tap water in Kudube Unit 1, Hammanskraal

The water in Kudube Unit 1 in central Hammanskraal comes out of the taps in very small quantities and at a very slow pace. Furthermore, as illustrated in Figure 4.2, the water has a musty brownish colour, and contains some minute substances that appear like fine soil particles. The researcher observed that the water gets progressively worse the longer the tap is opened, transitioning from a light brownish colour to a very dark brown, with even bigger soil-like particles present. Resident G of Tamboville stated that before the taps in her area ran completely dry, the water quality had also deteriorated to the state of the water in Kudube Unit 1, and also had an odour of rot. Residents A, B and D believe that the quality of the water is the result of deteriorating infrastructure at the Temba Water Purification Plant in particular was to blame, as the water from there was far more poor in quality than in any other part of the township.

While some households were able to install domestic water storage tanks when the water quality and availability problems started, many more were unable to afford the prohibitive costs of this intervention. As such, they continued to use the poor quality water, or to rely on water trucks that the City of Tshwane metropolitan municipality would later dispatch to water collection points on a bi-weekly basis. According to the participants, it was at this time that spaza shops, or informal convenience stores that line townships and rural areas in South Africa, that specialised in the sale of clean drinking water began to emerge in Hammanskraal, as seen in Figure 4.3. During the course of data collection for this study, the researcher noted that many of these informal water retailers are located in central, eastern and the Temba section of Hammanskraal.



Figure 4.3: Spaza shop selling bottled water in Temba.

Figure 4.3 illustrates a spaza shop selling bottled water on the main road in Temba. The water is supplied in 2, 5 and 10 litre containers. This particular store sells both directly to individual customers as well as to other small-scale informal retailers. Resident J, a spaza shop owner in the Kanana section, stated that she purchases her water from a similar spaza shop at R1 per or

\$0.05 U.S dollars per litre. Due to her failing health, she is unable to carry the water from the shop to her house, and as such, pays a neighbour's son R20 or \$1.07 U.S dollars, to use her wheelbarrow to collect the water on her behalf.

For the majority of participants in this study, while the water quality has been very poor over the years, they still use it for some domestic duties such as washing the laundry and cleaning the house. Residents who use the water for cooking stated that they understand the dangers involved in doing this, but that they had limited options owing to the insufficient water provisions that were being provided by the City of Tshwane metropolitan municipality.

Participant T, a lecturer in the Department of Public Administration at the Tshwane University of Technology, which is located in Soshanguve just next to Hammanskraal, argued that the failures of the state to provide safe drinking water in Hammanskraal led to an untenable situation where residents not only became dejected and opted for unsafe water, but where inequalities within communities were heightened. He contended that the fact that some households had alternatives such as water storage tanks, while others did not, created a dynamic of inequality that could have impacted on social relations, particularly as the water challenges intensified. This was echoed by resident H, who stated that while residents in formal housing were initially willing to share their water with those in informal settlements, as the situation intensified and scarcity became worse, this generosity was no longer being extended. Participant T stated that community relations arising from water scarcity challenges have not been adequately studied, and that this should be something that is looked into by those invested in the sociological perspective of water insecurity.

Alternatives to clean drinking water

As water supply became unstable and the water quality also began to deteriorate to a point where the water ceased to be safe for human consumption, the City of Tshwane metropolitan municipality intervened by designating water distribution points across Hammanskraal. The municipality procured water trucks that would be used for this intervention. As early as 2008, when intermittent shutting off of taps started, residents of Refentse (formerly Stinkwater) were receiving water from these water trucks. At the time, the water quality problems had not

deteriorated to the levels that it would in just a few years, and as such, the water trucks did not cater to the entirety of Hammanskraal. However, by around 2016, nearly all of Hammanskraal relied on water trucks, resulting in the increase in the number of water distribution points. At the time of the collection of data for this research study, in March 2023, there were no less than 20 water distribution point across Hammanskraal, most of them concentrated in central, east and north-east areas of the township, as well as in Temba. Significantly, water distribution points were also established in informal settlements that were once completely cut off from water supply by the municipality due to them being established on illegally occupied land that did not have any bulk water and sanitation infrastructure.

While water trucks initially provided great relief to the residents of Hammanskraal, according to the participants of this study, particularly residents A, B, C, D, G and J, problems began to emerge just after the local government elections in 2016 when the frequency of water distribution decreased from thrice and twice a week to just once a week. Residents of Temba attributed this to a change in government, which according to their assessment, resulted in the de-prioritisation of water supply to Hammanskraal. Prior to the 2016 local government elections, the African National Congress had governed the City of Tshwane. However, the party was ousted from power in 2016 by a multiparty government led by the Democratic Alliance. This change of power resulted in a shift in municipal priorities, according to residents B and D.

The water trucks that deliver water to distribution points are not without problems. According to the participants, some of these water trucks are structurally damaged due to lack of maintenance and over-use. This results in some of the water being lost, which further lessens the water rations that residents of Hammanskraal are provided. Residents A, B, D, G, H and J all stated that their water provisions had, at different points, been affected by the state of the water trucks delivering water in the township. They cited incidents of the trucks breaking down on the way to delivering water, as seen in Figure 4.4., resulting in residents having to wait for hours at a time for the water. Resident B recounted a situation where a water truck lost volumes of the water it had come to deliver when a pre-existing crack on one of the gigantic storage tanks burst open at the distribution point, resulting in water being emptied onto the ground, with many residents scurrying to collect the spilling water.



Figure 4.4: Broken down water truck on Lucas Mangope Road.

As though to corroborate the assertions that had been made by the participants about the state of some of the City of Tshwane metropolitan municipality's and its service providers' trucks, on the way from conducting interviews in Refentse, the researcher came across a broken down water truck on Lucas Mangope Road in the Diloppe section of Hammanskraal. Figure 4.4. captures the stationary truck with tens of litres of water spilling onto the road. Upon inquiry, the driver of the truck explained that he was on his way to a water distribution point in Mandela Village just a few minutes from Diloppe.

Participant O, an official in the Department of Water and Sanitation at the City of Tshwane Metropolitan Municipality, stated that the incidents of breakdowns of water trucks rarely occur with trucks owned by the municipality as these are well maintained and undergo regular servicing. He stated that the fault lay with the service providers who do not maintain their fleet adequately and who, as a result, experience constant breakdowns. When asked what the municipality as a paying client is doing about this situation, considering the cost of water losses from the broken down trucks and the inconvenience that the breakdowns cause for residents in desperate need of water, participant O stated that the municipality would intensify its

monitoring and evaluation of the work of the service providers and the state of their water trucks.

4.3.2 THE 2023 CHOLERA OUTBREAK IN HAMMANSKRAAL

In May 2023, the township of Hammanskraal became the epicentre for a devastating cholera outbreak that would go on to claim the lives of more than 20 people within two months. Hundreds more would be admitted to hospital with varying degrees of sickness. By July 2023, the source of the outbreak would still not have been identified. However, both the national and local government would allude to the great possibility and probability that the water quality in the township was the source. And while many South Africans were stunned by the outbreak of a disease that is largely considered as 20th century problem, the residents of Hammanskraal stated that not only were they not shocked that this would be the logical outcome of the water insecurity challenges in the township, but that cholera and related illnesses had been present in Hammanskraal for a long time, albeit not at the magnitude of the 2023 outbreak.

Resident H, who has lived in an informal settlement in Carousel View for a number of years, stated that numerous people in the community had fallen ill from a sickness that he later came to understand is cholera. He stated that in his own household, his young children had experienced gastrointestinal pains, severe diarrhoea and vomiting, as a result of consuming contaminated water as far back as 2018, but that this was treated with home remedies. This was corroborated by resident F, who rents a backroom in Ramotse but whose mother lives in Steve BikoVille. She stated that her elderly mother became sick from consuming dirty water in 2019, and that the nurses at Jubilee District Hospital in Temba had informed her that she might have contracted cholera disease. And though no tests were run at the time, her mother exhibited all the symptoms of cholera, including severe watery diarrhoea. This was successfully treated and advise was provided on how to purify tap water. The participant stated that after her mother returned from hospital and began to follow instructions on how to purify the water before drinking and cooking with it, she ceased to have any problems with diarrhoea, vomiting and the severe gastrointestinal pains that had plagued her for many years.

The advent of the cholera outbreak in Hammanskraal was the breaking point for many residents. Although they had been drinking the unsafe water over the years, the fact that this simple act of human survival was resulting in fatalities prompted many to stop using the water, even as some simply could not, due to the prohibitive costs of acquiring water from private sources such as retail stores. And despite the City of Tshwane metropolitan municipality establishing water distribution points within the different areas of Hammanskraal, and numerous non-governmental organisations (NGOs) and community-based organisations (CBOs) also providing water to the most vulnerable communities within the area, most participants stated that this measure was simply inadequate as the water provisions were not sufficient for most households. According to the participants, many households in Hammanskraal have, on average, six people living together. As such, their water needs, both for consumption and for sanitation purposes, exceeded what was available to them. And while water purification shops had always existed in Hammanskraal, according to participants in this study, the advent of the cholera pandemic brought with it the establishment of many more small businesses that traded in purified water and ice, as illustrated in Figure 4.5 and Figure 4.6.



Figure 4.5: Shop selling purified water on Main Road.



Figure 4.6: Sale of purified water in Temba

As shown in Figure 4.5 and 4.6, small businesses trading in purified water and ice began to line up the streets of Hammanskraal when the cholera outbreak hit. Figure 4.5. shows a typical outdoor room that is normally rented out or used by an older male member of the family as a bedroom. However, in some households, such as this one in Temba, these rooms were turned into shops for purified water. Two types of these shops began to emerge in Hammanskraal: ones where the water is purified on site, as seen in Figure 4.6., and ones where the water is already purified and is sold in containers of varying sizes. According to resident D, with the emergence of so many businesses trading in water, there were concerns that some of them were selling water from taps in other parts of the City of Tshwane, as well as areas with better quality drinking water such as Refentse and claiming that the water was recently purified. Because of this, many residents preferred shops where the water is purified on site, such as the one illustrated in Figure 4.6., as they felt that this water was much safer and more reliable.

Despite the fact that the water security challenges in Hammanskraal had been almost two decades in the making, and that communities had long raised the alarm about the unavailability of water as well as its deteriorating quality, the City of Tshwane metropolitan municipality rarely consulted with community members about their experiences or took them into

confidence about the interventions that the municipality was working on to resolve the problem. Residents B, D and H stated that the only time that the municipality would visit their communities to discuss the issues of water was when a protest would be staged. Residents B and D stated that over the years, particularly in the five years leading to the 2023 cholera outbreak, there had been no less than three major protests, lasting days, about the state of water in Temba. This would be the only times that government officials engaged with members of the community, making commitments that would remain unfulfilled. Resident H stated that this lack of political will resulted in many residents resigning themselves to the fact that they would need to develop interventions outside the state. However, following the cholera outbreak, government began to engage with communities once more, as seen in Figure 4.7.



Figure 4.7: Community meeting

Figure 4.7. was taken on the 28th of May at the Hammanskraal Community Centre in Mandela Village. The meeting, attended by members of the broader Hammanskraal community, was called by the Department of Water and Sanitation and the City of Tshwane metropolitan municipality. The Minister of Water and Sanitation, Mr Senzo Mchunu, along with senior officials from his department as well as the municipality, were present at the meeting. Participant K, the local councillor of Ward 73, invited the researcher of this study to the meeting

to listen in on the grievances of the residents as well as the updates on what was being done to stop the spread of the cholera outbreak, from the national and local government.

4.4: DISCUSSION

4.4.1. THE SOCIO-ECONOMIC IMPACTS OF WATER SECURITY CHALLENGES ON THE RESIDENTS OF HAMMANSKRAAL

The primary data collected from residents of Hammanskraal and observations made in the township highlight the extent to which the water security challenges impact on the day-to-day existence of people in the community. Firstly, water insecurity in Hammanskraal has a significant impact on people's health and physical well-being. Some residents who participated in the study indicated that long before the 2023 cholera outbreak, they had been experiencing some sickness that they would later understand to be cholera, though it was not as severe as the strain that would ultimately claim lives in 2023. The cholera outbreak that devastated Hammanskraal in 2023 saw residents develop severe diarrhoea, stomach cramps and vomiting, with several of these people dying as a result (Ramushwana, 2023). An important analysis that is yet to be made with regard to Hammanskraal is the impact that the cholera outbreak that was caused by its contaminated water had on people living with chronic illness, particularly HIV/AIDS.

With South Africa having the highest HIV rate of infection in the world and prevalence being especially high in Black people with poor socio-economic backgrounds (Zuma *et al.*, 2022) such as those in townships like Hammanskraal, it would be necessary to reflect on what a cholera outbreak could mean in the context of an HIV/AIDS epidemic. In a study on the risk factors for self-reported cholera within HIV-affected households conducted in rural Haiti in the Caribbean, Richterman *et al.* (2018) discovered that there are interactions between cholera and HIV which are especially pronounced in individuals who are from a low-income background, food insecure and who must travel distances to collect drinking water. Residents of Hammanskraal were confronted with similar conditions. They are in a poor working-class township and had to travel fair distances to collect safe drinking water from distribution points. In addition to this, research focusing specifically on the City of Tshwane metropolitan municipality indicates that urban food insecurity is particularly pronounced in the townships

(Mudau and Mahlatsi, 2022). With all these factors, it is most probable that the water security challenges in Hammanskraal have an impact on health and wellness for chronically ill residents.

Secondly, water security challenges in Hammanskraal affects schooling, including early childhood development as stated in the previous chapter by resident G, a participant in this study who highlighted that her 7-year-old child is affected by the water challenges in Tamboville. Long before the cholera outbreak hit Hammanskraal, schools in some parts of the township had been without safe drinking water. According to the Pretoria Rekord (2023) over the past few years, the Gauteng Department of Education has had to provide emergency water to schools on at least sixty-seven occasions, as well as twenty emergency sanitation units, with the latter being an intervention aimed at alleviating the crisis of sanitation shortages in the township.

According to The Water Project (2023b) lack of clean water has a severe impact on schooling and can affect both student's academic performance and attendance. The organisation contends that lack of clean drinking water can cause students to become sick from illnesses like diarrhoea, which would make them lose momentum in their studies. Additionally, students can miss classes due to having to collect water or even to take care of their parents and siblings who fall ill due to illnesses such as cholera (*ibid*). Teachers may also fall sick due to the same reasons, resulting in classes being cancelled and students losing learning time. This situation is especially dire for girls because statistics indicate that seven million girls are reported to be absent from school each month due to lack of sanitary pads, translating to them missing 25 percent of learning in just a single school year (Khamisa *et al.*, 2022), For those who do have access to sanitary pads, it is crucial to have access to water and sanitation in schools.

Thirdly, water security challenges in Hammanskraal affects social relations within communities. As explained in the previous chapter by one of the participants in this study, resident H, who lives in an informal settlement in Carousel View, water unavailability affected social relations. Those in informal settlements with no access to water at all initially relied on water from their neighbours living in formal households within the community. But as these

neighbours also started experiencing water shortages, they became less willing to share their water.

The equity dimensions of water security challenges in Hammanskraal also have a direct impact on the residents' capacity for livelihood generation. One of the participants in the study runs a small business which is affected by water shortages and poor water quality. The impact of this extends beyond her inability to generate income. This inability to generate income impacts on the ability to lift oneself out of poverty. As poverty in South Africa is both racialised and gendered, with Black women more impacted by it (Bennett, 2009; Cheteni *et al*, 2019; Mahlatsi, 2021), the uneven distribution of quality water reproduces and exacerbates these gendered and racialised inequalities.

4.4.2. THE SOCIO-POLITICAL IMPACTS OF WATER SECURITY CHALLENGES IN HAMMANSKRAAL

The interpretation of the causes of water insecurity by residents of Hammanskraal, as outlined in this chapter, is a clear indication that water is a deeply political issue in the township. Data collected in this study indicates that residents of Hammanskraal analyse the situation of water insecurity in the township behind partisan lenses, with many associating the water challenges, or at least their exacerbation, with the multi-party government led by the Democratic Alliances. This is despite evidence that the problem began almost two decades ago and has been progressively worsening under successive governments led by the African National Congress (Evans, 2021a; Mahlatsi, 2023). But it is not only the residents of Hammanskraal who have engaged in this rewriting of history. The national Department of Water Sanitation has also laid the blame for water challenges in Hammanskraal at the foot of DA-led administrations (Goba, 2023a) while the DA-led administration argues that it is the ANC-led government that started the crisis by ignoring expert advice that could have resolved water and sanitation problems more than a decade ago (Mahlangu, 2023). All this is an indication that even government, both at a national and local level, employs a partisan lens in its analysis of the situation.

The politicisation of the water security challenges in Hammanskraal has led to a situation where water is a determinant of electoral politics. According to Mahlati (2023) and Matlhabe (2023),

residents of the township have made it clear that their votes in the upcoming 2024 general election will be determined by whether or not the water challenges are resolved. This would not be the first time that residents have figuratively put water on the ballot. In the 2021 local government elections, residents had also used water as a bargaining tool, stating that they would not vote for the ANC if the situation was not resolved (Tshikalange, 2021). And based on the low voter turn-out in Hammanskraal, which the Gauteng City Region Observatory mapped at 70.1 to 85 percent of registered voters having not turned up to vote (Mkhize *et al*, 2021) it is evident that water has indeed become a key factor for the Hammanskraal electorate.

In 2019, Hammanskraal and the neighbouring township of Soshanguve were brought to a standstill by violent service delivery protests that lasted for almost a week. Protesters had blocked major roads in the township with burning tyres and rocks, effectively shutting down most economic activities. According to Kajee (2019) one of the key issues that the residents of Hammanskraal were protesting for was clean drinking water. Similar scenes had been witnessed a few years prior when the community of Steve Biko went on a protest following the deaths of three young boys who died after being hit by cars, in separate incidents, while fetching water from a nearby stream (Masilela, 2023). This is an indication that in Hammanskraal, water is increasingly becoming a basis for service delivery protests, many of which turn violent in nature. In the 2019 protests, law enforcement resorted to using rubber bullets, stun grenades and tear gas to disperse the large crowds that were protesting and to contain the unrest (Kajee, 2019). This kind of violent confrontation between the state and citizens over water confirms the work of researchers such as Koren *et al.* (2021) who argue that water insecurity is increasingly becoming a cause of social unrest in Africa. The work of Koren *et al.* (2021) focuses on Kenya but has applicability in settings such as Hammanskraal where service delivery protests about water insecurity also highlight related issues such as unemployment and hunger. The study argues that food insecurity reinforces the impact of water insecurity on social unrest, and vice versa (*ibid*), which is what we are observing in Hammanskraal and other townships across South Africa.

The nature and format of community meetings in Hammanskraal as observed in this study also illustrate the participatory inequities that exist in terms of who is sitting at the table when water security issues are being discussed. The fact that meetings took place at night meant that women

primarily were unable to participate owing to safety and security concerns as well as the fact that the domestic space is gendered, and thus, women and girls are primarily responsible for work in the reproductive space. This likely unintended consequence of having community meetings at night has an impact on women and deepens the gendered inequities that already exist in water provision. These are outlined by Pouramin *et al* (2020) who contend that there is an intersection of water and gender with health, among other socio-economic issues.

Water security challenges in Hammanskraal also have legal implications. As outlined in Chapter 3 of this study, chapter two of the Constitution of the Republic of South Africa Act 108 of 1996 states that “everyone has the right to have access to sufficient food and water” and that water services institutions must take the necessary steps to ensure the realisation of this right. So critical is this right that the National Assembly enacted the Water Services Act 108 of 1997 with the express purpose of providing for the right to basic water supply as well as basic sanitation (SAHRC, 2018:1). In addition to this, being a signatory to various international human rights protocols, policies and frameworks, including the United Nations Sustainable Development Goals, South Africa has committed to not only elevating water to a fundamental human right but also, to ensuring its universal provision. As such, failure to provide clean drinking water in Hammanskraal is not only a violation of human rights as stated by the South African Human Rights Commission (2019) it is also a violation of international human rights law.

4.5. CONCLUSION

South Africa, like the entire sub-Saharan region, is a water scarce country and its water resources are highly variable across the country (South African Cities Network, 2016). But while water security challenges are experienced by the people of South Africa collectively, the impact is especially felt by the poor working-class majority that has no access to means of production that would allow for building resilience against water scarcity, shortages and unavailability. In the context of a South Africa where access is a function of race and class, the people of Hammanskraal, a majority of whom are Black and poor, are on the receiving end of the persistent legacy of separate development that was orchestrated by colonial and apartheid regimes. This legacy is particularly pronounced in rural and peri-urban areas. The dynamics that shape water access cannot be understood outside the history that shapes South Africa’s

spatiality (Sepeng, 2019). This is elucidated by Ngcukaitobi (2018) who reflects on the ways in which the effects of South Africa's history of dispossession have irrevocably shaped the geographies, politics and economy, of rural and urban modern-day South Africa.

CHAPTER 5: GOVERNANCE DRIVERS OF WATER SECURITY CHALLENGES IN HAMMANSKRAAL

CHAPTER SUMMARY

This chapter provides results and a discussion of the governance drivers of water security challenges in Hammanskraal, responding to objective 3 of this study as outlined in Chapter 1. Objective 3 of this study is **to explore the governance drivers contributing to water insecurity in Hammanskraal, City of Tshwane**. Primary data is collected from the residents of Hammanskraal who are effected by poor water governance, as well as officials of various tiers of government, who are directly responsible for water governance and water infrastructure development. Data used in the analysis in this chapter was also collected Tshwane University of Technology that is situated in a township neighbouring Hammanskraal, namely Soshanguve, and the South African Association of Public Administration and Management, whose mission it is to “encourage and promote good governance and effective service delivery through the advancement of professionalism, scholarship and practice in public administration and management” (SAAPAM, 2023). The data provided important master themes that were engaged upon in the discussion, at the centre of which was poor water governance as a primary driver of the water security challenges in Hammanskraal. The poor water governance in Hammanskraal has been costly to the fiscus of the City of Tshwane metropolitan municipality, as outlined by Chabalala (2023) and Mahlangu (2023), drawing the link between poor governance and economic decline. This is especially because the redirection of the municipality’s constrained revenue towards private water distributors is marred by tender corruption (le Roux, 2023). According to Sebake and Sebola (2013) this tender corruption has a significant impact on service delivery and undermines the very foundation of good governance as outlined in the principles of Batho Pele that are aimed at guiding the transformation of service delivery.

5.1. INTRODUCTION

The township of Hammanskraal has been faced with water security challenges for nearly two decades (Evans, 2021a). Despite communities raising concerns about this crisis for many years, it was not until the cholera outbreak that began in May 2023 that the spotlight was finally shone on the township that has, for eighteen years, been denied its constitutional right to safe drinking water. The water crisis has become so significant an issue in Hammanskraal that it has become critical to voting choices. Leading up to the 2021 local government elections, residents of Hammanskraal indicated that water would be front-and-centre in determining their voting choices. One resident is quoted as saying: “I’m voting for clean water, I’m here today and the

water flowing from my tap is still not drinkable” (Mahlangu, 2021). Whether these sentiments influenced the significantly low turn-out that was observed in Hammanskraal and townships across the City of Tshwane (Mitchley, 2021a; Mkhize *et al.*, 2021) is not clear, but the fact that residents of the township are using water to bargain with political parties is indicative of the collective sense of frustration that engulfs Hammanskraal. There are indications that the water security challenges in Hammanskraal could once again potentially influence the voting choices of community members going towards the 2024 general election in which national and provincial governments will be elected. According to Mahlali (2023) residents of Hammanskraal attended a community meeting addressed by the recently elected Secretary-General of the African National Congress, Fikile Mbalula, in which they informed him that unless the water challenges are resolved, they would not participate in the 2024 general election. This is an indication of the extent to which poor water governance in Hammanskraal could potentially shape the overall political and administrative governance of the City of Tshwane metropolitan municipality.

The challenges of water governance in the City of Tshwane are a product of historical constructs of apartheid’s policy of uneven development as well as post-apartheid challenges of the hollowing out of water security institutions as well as the failure to implement the National Water Act (Schreiner, 2013). The overall poor governance of the City of Tshwane metropolitan municipality, which is characterised by maladministration and corruption, has also played a significant role in the governance drivers that have impacted water security in Hammanskraal. In September 2023, President Cyril Ramaphosa signed Proclamation R 138 of 2023 authorising the Special Investigating Unit (SIU) to investigate allegations of maladministration and corruption in the affairs of the City of Tshwane metropolitan municipality, and to recover any financial losses suffered by the State (Special Investigating Unit, 2023). The said Proclamation authorises the SIU to probe the procurement and/or contracting for construction of Phase 1 upgrades and urgent refurbishment at the Rooiwal Wastewater Treatment Works (*ibid*) which have been marred in corruption and resulted in the municipality’s failure to facilitate the crucial infrastructure development needed to alleviate the water security challenges in Hammanskraal.

5.2. METHODS OF DATA COLLECTION

Three methods of data collection were used to obtain data on the governance drivers of water security challenges in Hammanskraal. These methods include interviews with residents of the said township as well as various government officials across three tiers of government (national, provincial and local). In addition to interviews, for which the schedule is provided in Chapter 3, there was also direct observation in Hammanskraal. This included attending a community meeting aimed at addressing the water crisis following the outbreak of cholera, to assess the nature of engagement between government officials and residents of Hammanskraal. Finally, secondary data in the form of newspaper articles, academic text and reports from the national, provincial and municipal (local) government was used to glean information on the barometer of the historical and contemporary water governance issues in Hammanskraal.

5.3. PARTICULARITIES OF GOVERNANCE DRIVERS OF WATER INSECURITY IN HAMMANSKRAAL

This research demonstrates that there are key governance challenges for water resources management and water and sanitation services in the township of Hammanskraal and in South Africa broadly. Specifically, there are challenges related to scale mismatch, policy coherence, data, monitoring and evaluation, funding, transparency and integrity, and stakeholder engagement.

An important point to note about water security challenges in Hammanskraal is that while the township may have a universal problem of water insecurity, the problem also has some particularities in that different sections of the township experience different degrees and even different forms of water insecurity. To understand this, it is necessary to draw attention to the question of who is providing water within the different sections of the township. As outlined in Chapter 3, the right to water is enshrined in Section 27 of the Constitution of the Republic of South Africa Act 108 of 1996 which in turn is given expression by the National Water Act 36 of 1998 and related water policies. But while the national Department of Water and Sanitation is the custodian of the country's water resources, all three tiers of government (national, provincial and local) have a constitutional duty to ensure that water and sanitation services are provided in a manner which is equitable, sustainable and efficient (SAHRC, 2018). The national government manages the country's water resources through various water boards. According to the Auditor-General of South Africa 2022) there are currently nine water boards

in the country, namely: Rand Water, Umgeni Water, Bloem Water, Mhlathuze Water, Lepelle Northern Water, Amatola Water, Sedibeng Water, Magalies Water and Overberg Water. While national government manages water resources through these boards, the delivery of water and sanitation services to communities is a municipal function. Municipalities are mandated by law to draw up water and sanitation delivery plans. Before the water is supplied to households, it needs to be treated. According to the DWS (2023h) the raw water that is abstracted from rivers and dams must be treated by either water boards or municipalities, and only thereafter, supplied to households. The water that is provided to households must meet the quality standards that are set by the South African Bureau of Standards.

In most municipalities across the country, one entity is responsible for the provision of water to households. Either a municipality or water board bears this responsibility. But in the case of Hammanskraal, the situation is significantly different. According to the Department of Water and Sanitation (2023h) the City of Tshwane receives its water from two water boards, namely Magalies Water and Rand Water, as well as from its own Water Treatment Works. Some sections of Hammanskraal, mainly in the west in areas like Refentse (formerly Stinkwater) receive their water from Magalies Water, while others receive it from Rand Water. Other sections, including Temba, receive their water from the Temba Water Treatment Works. The said treatment works only supplies the township of Hammanskraal in the entire City of Tshwane metropolitan municipality (*ibid*). The implication of this dynamic is that while Hammanskraal as a whole is confronted with water insecurity challenges, they differ based on the particular challenges that confront each water board as well as the Temba Water Treatment Works.

An interesting theme that emerged in the interviews conducted with residents of Hammanskraal is that the water security challenges in the township are largely a political construct. By this, the residents meant that different political administrations have had a different approach to resolving the challenges, with some doing more than others. There was a sense that under the administration of the former Executive Mayor, Kgosientsho “Sputla” Ramokgopa, which lasted from 2010 to 2016, there were significant inroads that were made in dealing with the water challenges facing Hammanskraal and the broader City of Tshwane. Seven of the residents who participated in this study stated that the water insecurity challenges had worsened since 2016

when there was a change of government from the African National Congress (ANC) to a multiparty government led by the Democratic Alliance (DA). It is argued that Ramokgopa had a concrete strategy on resolving the water insecurity challenges across the administrative capital. This is a point that he also made in his last State of the Capital Address (SOCA) in 2016 when he stated that the City of Tshwane had completed a water resource master-plan, according to which the Roodeplat and Rietvlei water purification plants could be extended to provide an additional 200 mega-litres of water per day (City of Tshwane, 2016: 15). According to participants K and L, who serve as ward councillors, the said Water Resources Master Plan was never implemented by the administrations that succeeded Ramokgopa.

The City of Tshwane Water Resources Master Plan was developed in 2015 with the aim to outline a strategy for the upgrading and extension of the municipality's water infrastructure so as to reduce the municipality's dependence on water resources imported from the Vaal River basin (City of Tshwane, 2015). The Master Plan also concerns the Olifants River basin and the Crocodile River basin, which receive significant sewer return flows from the City of Tshwane. This has an impact on the yields of the local water resources and water allocations to downstream users. In terms of key sanitation projects, the Master Plan recommended the extension of the Rooiwal Wastewater Treatment Plant sludge facility that would treat 80 mega-litres of waste per day, as well as the extension of the Temba Water Purification Plant sludge facility that would treat an additional 20 mega-litres of waste per day. The Master Plan also recommended the development of new wastewater treatment plants, namely Sunderland Ridge in the south of the City of Tshwane and new modules at the Bavianspoort Wastewater Treatment Plant and the Rietgat Wastewater Treatment Plant.

In terms of the key water projects, the Temba Water Purification Plant was to be expanded. This was to include the construction of northern water reticulation in Refentse (Stinkwater) extension 2 (City of Tshwane, 2015). In addition to this, there would be a replacement and upgrading of deficient bulk pipelines and Wonderboom Delivery Pipelines, the upgrading of Rietvlei Wastewater Treatment Plant and bulk distribution, the easterly reinforcement of the Bronberg bulk system, as well as the extension of Bronberg bulk from Goedemoed junction to Mooiwater reservoir (*ibid*). The Water Resources Master Plan also envisaged the construction

of a new reservoir to increase the water capacity of the City of Tshwane northern region, which includes Hammanskraal and Soshanguve.

While some participants in the study argue that the post-2016 dispensation did not implement the Water Resources Master Plan and as a result, plunged Hammanskraal into a deeper water insecurity crisis, according to participant S, the Executive Director of the South African Association of Public Administration and Management (SAAPAM) the failure of implementation occurred even under the Ramokgopa administration. He stated that in 2011, under the said administration, a report titled *Improvement of the Water Quality in the Hammanskraal Area Acceleration of Programme* was tabled before the Mayoral Committee. The said report was approved in November of the same year. It made some key recommendations on building the water and sanitation infrastructure capacity of Hammanskraal in light of the fact that the Rooiwal Wastewater Treatment Works plant had already, by then, be nearing its capacity. According to participant S, the report was later disregarded and none of its recommendations were implemented by the Ramokgopa administration or its successors.

Participant T stated that the *Improvement of the Water Quality in the Hammanskraal Area Acceleration of Programme* and the Water Resources Master Plan that were developed under the Ramokgopa administration were not the only reports that looked into the state of the City of Tshwane's water and sanitation infrastructure. As early as 2004, the administration of the ANC's Smangaliso Mkhathshwa which governed the metropolitan municipality from 2000 to 2006, adopted a Master Plan that also recommended the expansion of the Rooiwal Wastewater Treatment Works plant, as well as the increase in the water capacity of the City of Tshwane through the construction of significantly more reservoirs of 55 mega litre capacity. Neither the Mkhathshwa, Gwen Ramokgopa or Kgosientso "Sputla" Ramokgopa administrations which served in 2000 to 2006, 2006 to 2010 and 2010 to 2016, respectively, and all which were ANC, implemented the recommendations. As such, residents who argue that water security challenges in Hammanskraal are a political construct of the post-2016 administration(s) are, according to participant T, being disingenuous.

There is no question that a lot of the water infrastructure that is currently being utilised in Hammanskraal was developed and constructed decades ago – as far back as the apartheid dispensation as illustrated by Figure 5.1.



Figure 5.1: A plaque at the Temba Water Purification Plant

The researcher did a walk-about at the Temba Water Purification Plant, to assess the state of the water and water treatment infrastructure. It was observed that most of the infrastructure at the plant is aging and that even where maintenance is being done, there are significant structural limitations arising from the infrastructure being too old. Figure 5.1 shows a plaque, one of several across the plant, that states that the 5 mega litre reservoir was built by the Department of Water Affairs of the government of Bophuthatswana in the 1980s. Bophuthatswana was a homeland established under the Promotion of Bantu Self-governing Act 46 of 1959, which facilitated the transformation of traditional ethnic lands into “independent states”. The reservoir shown here was opened in October 1989, five years before the end of apartheid. Other reservoirs at the plant, illustrated in Figure 5.2, are also old.



Figure 5.2: Reservoirs at the Temba Water Purification Plant

The Temba Water Purification Plant is located in to the north-west of Temba in Hammanskraal. The researcher visited the plant and was given a tour of it. Most of the infrastructure at the plant is visibly dated, with many steel and metallic parts on pumps showing signs of rust. Numerous leaks were also observed, with many puddles of water within the facility. Some of the leaks were not from equipment on the surface or taps, and it was indicated that they may be the result of the worn down bulk infrastructure underground. The facility is lined with numerous 5 mega litre reservoirs as seen in Figure 5.2. Upon close inspection, it was observed that a significant number of these reservoirs were built by the Lucas Mangope administration, which governed the Bophuthatswana homeland that Hammanskraal was under, from 1977 until 1994. It was also observed that the wastewater pumps and filtration systems were struggling with the amount of sedimentation due to the age of the infrastructure. All this corroborated the assertions of participants T and S, who stated that all administrations since the establishment of the City of Tshwane Metropolitan Municipality in 2000 had not invested meaningfully in significantly expanding the water and sanitation infrastructure in Hammanskraal which, as participant O argued, posed the greatest threat to water security in Hammanskraal than any other natural and biological factor.

Participants Q and R, directors in the Gauteng Department of Human Settlements and Infrastructure Development and the Gauteng Department of Cooperative Governance and Traditional Affairs (CoGTA), respectively, stated that the challenges with water provision in the City of Tshwane are fundamentally a failure of governance. Participant R argued that the said metropolitan municipality has been in a concerning state of decline due to political instabilities. The impact of this political volatility on service delivery in Tshwane, particularly in townships such as Hammanskraal, has been catastrophic. The participant posited that this was what had led the former MEC of CoGTA, now the MEC of Human Settlements and Infrastructure Development, to place the municipality under administration in 2020 – although this decision was later set aside by a ruling of the Constitutional Court which found it unlawful. According to participant Q, the City of Tshwane Metropolitan Municipality, and not the Gauteng Provincial Government, has the responsibility of ensuring that the water distributed to households is clean and safe for consumption. She stated that the municipality had failed at this, as well as implementing the commitments made to expand the water and sanitation infrastructure despite budget allocations for the work.

Residents I and E live in Refentse, formerly Stinkwater, which is located in the far-west of Hammanskraal. They stated that their challenge was not necessarily water availability as their area had not suffered the severe extent of water unavailability as most parts of Hammanskraal. Their main concern was the ageing stormwater infrastructure in Refentse as seen in Figure 5.3. They stated that the area has a dysfunctional water drainage system, which results in flooding when it rains heavily. In addition to this, stormwater runoff in the area has created permanently wet roads - both paved and unpaved. This affects cars in the area, as well as limiting public spaces where children can engage in recreational activities such as playing soccer or even just casually socialising.



Figure 5.3: Urban runoff in Refentse (Stinkwater)

As Figure 5.3 illustrates, in Refentse, uncontrolled urban runoff is further damaging the unpaved and paved roads. On paved roads, it is worsening potholes, which in turn damages vehicles and increases the rate of car accidents. On unpaved roads, it is creating perennial mud conditions that make walking, using bicycles and related activities extremely difficult. Resident E stated that in addition to all this, the dysfunctional stormwater system is impacting on food security in her household. As she has big yard space, which is a common feature of homes in Refentse, she had intended to use her garden to plant onions, tomatoes, cabbages and other vegetables, which would have alleviated hunger in her household as well as saved her the money that she now uses to procure these goods that she could have planted by herself.

Participant K, who is the councillor for Ward 73, stated that the water leaks in Hammanskraal broadly were largely the result of a dysfunctional stormwater system as well as illegal water connections. Similar to illegal electricity connections, illegal water connections are done by diverting the flow of water. This is achieved by sawing off water pipes leading to the taps, and extending them with a steel, rubber or hard plastic pipe, and then redirecting them to the household that is doing the illegal connection. This is usually done with collaboration by the two connecting households. In some instances, water infrastructure underground is targeted. According to participant K, this is especially the case when the illegal connection is being done

for a bigger community, such as in informal settlements. In this case, a section of the large pipe beneath the ground is cut off, then diverted. This not only results in the destruction of water infrastructure, but it also presents the problem of perennial water pipe bursts that lead to leakages.

The councillor for Ward 73 also stated that the City of Tshwane metropolitan municipality had never conducted a study to determine the layout of water pipes in Hammanskraal. The result of this is that at times, people undertaking construction such as extending their homes, not knowing that they are building on top of water infrastructure. He stated that there are documented cases where people's homes have been flooded as a result of this. However, this explanation is disputed by participants N, O and P, who are officials in the municipality's Department of Water and Sanitation. They argue that the City of Tshwane has in fact conducted this study and does have a layout of where bulk water infrastructure has been laid. They attribute the problem to residents not submitting building plans to the municipality before commencing with building or extending their residences despite it being a legal requirement for permission to commence with construction to be sought from the Department of City Planning at the municipality.

The councillor for Ward 73 raised a curious point about the beliefs of the residents of Hammanskraal pertaining to the water leakages. He stated that many of them did not think that illegal pipe connections were to blame. Rather, they attributed the problem to the fact that portions of Hammanskraal were built on a wetland. This much was confirmed by the zonal secretary of the SANCO in December 2022 when a storm damaged numerous homes in the township (Dube, 2022). The councillor for Ward 73 insisted that this was not the case, but rather, that the lack of a stormwater drainage system was the real culprit.



Figure 5.4: A burst pipe causing fissures on the road surface in Refentse

The dysfunctionality of the stormwater drainage system in Hammanskraal is interaction with other conditions of dysfunctional public infrastructure. Fissures have begun to appear on the poorly maintained roads across the townships. As the leaking water settles onto these roads, the fissures are deepened and increased in length and width. This further weakens the roads. The councillor for Ward 73 contends that the challenges with the water infrastructure, including stormwater and sanitation infrastructure, are a microcosms of the broader challenges with ageing and unmaintained infrastructure not only in Hammanskraal but across all regions of the City of Tshwane metropolitan municipality.



Figure 5.5: A burst sewage pipe in Temba.

A dysfunctional stormwater system is not the only challenge confronting the people of Hammanskraal. Across the township, there are numerous burst sewage pipes that are spilling faecal matter and related waste onto the streets and walkways. According to residents B and D, who reside in Temba, the burst sewage pipe captured in figure 12 has been present for over a year. They also stated that throughout the years, it has consistently been repaired, but the repair work does not last for a long time as the problem is continuously recurring. The key concerns raised by the participants are that the burst sewage pipes produce unpleasant smells which affect nearby households and shops, and that the static water attracts pest infestations that could potentially cause sickness to both humans and animals.

5.4. POLLUTION OF WATER RESOURCES IN HAMMANSKRAAL: A CASE OF THE APIES RIVER

The Apies River flows through the City of Tshwane, with its source located in Erasmus Park south of the city. It flows northward, draining into Pienaars River, a tributary of the Crocodile River which forms the Limpopo River at its confluence with the Marico River. The residents of Hammanskraal, in which a large section of the river flows, refer to the Apies River as Tshwane. The river is an important source of water for the people of Hammanskraal. It feeds

the Leeuwkraal Dam from which the Temba Water Treatment Works extracts its water. The Apies River is hypertrophic downstream of the Rooiwal Wastewater Treatment Plant, which according to Mahlatsi (2023c) presently services more than 40 percent of the population of the City of Tshwane.

The Apies River is one of the most polluted water sources in South Africa, with the pollution being the result of various biological as well as human factors. In a study titled *Evaluating the Pollution of the Apies River in Pretoria South Africa*, Tau et al (2012) using chemical and microbiological methods. The study found that the pollution index of the Apies River is extremely high, and revealed that the concentration of most pollutants downstream is more than 50 percent of the upstream concentration. Explaining the sources of the pollution of the Apies River, the study states that: “The natural sources of the pollution in Apies River are the weathering of geological formations; whereas the anthropogenic sources are agriculture; Municipal WWTW and direct deposit of waste into the river” (Tau *et al.*, 2021). The study concludes with the argument that the current microbiological state of the Apies River makes it significantly harmful for human consumption, especially as drinking water. Though the study does come to this conclusion, it also contends that “the current physiochemical state of the River warrants its ability to be used for safe irrigation in agricultural practices” (*ibid*). It is important to note, however, that the study was conducted two years prior to the cholera outbreak. Whether its conclusions on the usability of the water from the Apies River for irrigation in agricultural practices would remain the same with the newly available information is not known.



Figure 5.6: Leeuwkraal Dam

The Leeuwkraal Dam, shown in figure 17, receives its water from the Apies River located just a few metres across from it. After the water is treated at the Leeuwkraal treatment facility, it is sent to the Temba Water Purification Plant just a few kilometres away. From there, the water is treated further and then purified. Following this process, it is then distributed to households across the township of Hammanskraal. However, as illustrated in figure 17, the water flowing into Leeuwkraal Dam is extremely polluted from the source. The researcher visited the dam's water treatment facility and was bowled over by the overwhelming stench that permeated the atmosphere like coiling miasma.



Figure 5.7: Pollution of the Apies River

The state of the Apies River is captured in figure 18. The river is extremely polluted, with plastic and other waste seen inside the water. There is also a significant algal bloom in the river caused by the presence of nutrients that are caused by the runoff of animal waste and sewage from the land. On the banks of the river, there is a lot of plastic and glass waste. Additionally, the overgrown grass seemingly does not receive any maintenance, which has resulted in dead leaves flowing into the river.

According to residents B and D who were born and raised in Temba, the river used to be clean and well-maintained in the past. However, years of the spillage of sewage into the river, as well as activities by residents of the township who often hosted parties on the banks of the river, leaving their waste behind, led to the deterioration of the river. Resident B recalled a time when there was fish and some monkeys in and alongside the river, but these have since ceased to be present owing to the severe levels of pollution.



Figure 5.8: Pollution and vandalism at the Leeuwkraal Dam wastewater treatment facility

The extent of pollution at the Leeuwkraal Dam water treatment facility and the Apies River across from it can be seen in figure 19. The image captures the entrance to the Leeuwkraal Dam water treatment facility. The researcher had to wear a surgical mask to conduct a walk-about of the area due to the overpowering stench and presence of flies and other insects. There is litter all across the facility, particularly at the entrance and the hill that separates it from the access point into Apies River. The vandalised building in the image once served as the reception centre for the water facility. However, over the years, the theft of steel and cables at the facility, coupled with extensive pollution by the surrounding community, resulted in its closure and abandonment by the City of Tshwane metropolitan municipality. In its place, a more fortified facility was built. And while this new facility has not been vandalised owing to the greater security measures that have been put in place, it too is not immune from the pollution that is occurring in the area as its entrance is also covered with litter and waste.

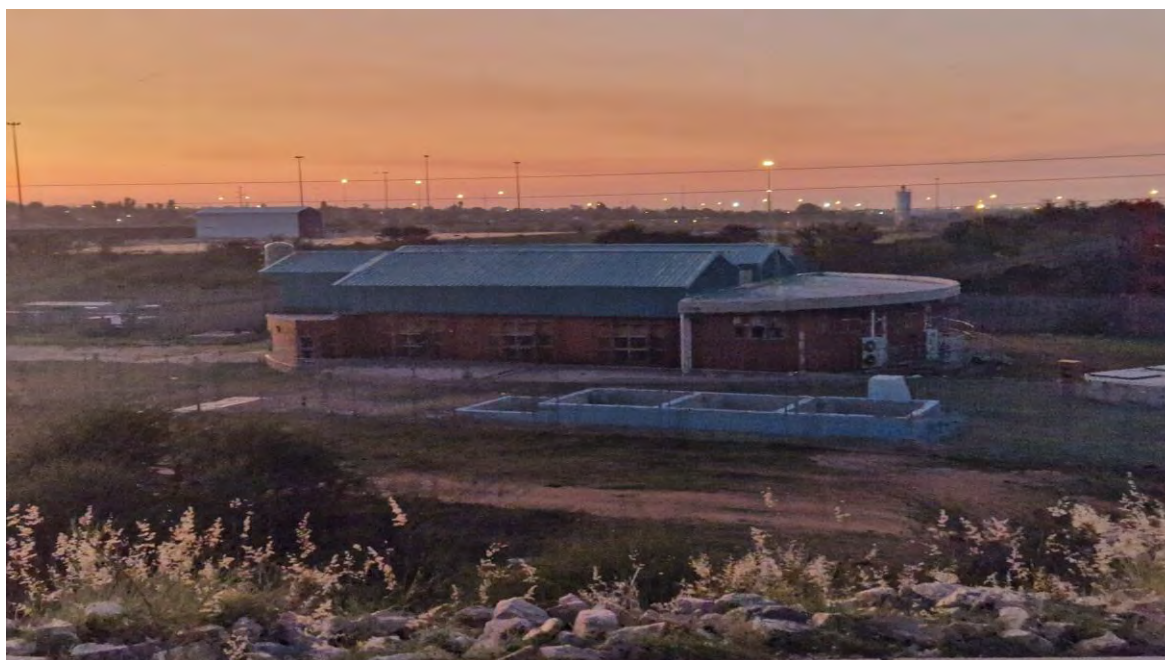


Figure 5.9: Razor-fence protecting infrastructure at Leeuwkraal Dam

The Leeuwkraal Dam water treatment facility is situated just across the Apies River that feeds water into it. Although the facility is fortified with razor-fence wiring all across as seen in figure 20, to protect it from vandalism, it is surrounded by heaps of waste from households which is contributing greatly to the pollution in the area. According to residents of Temba who participated in this study, the facility was built by the administration of the former Executive Mayor and now Minister of Electricity, Dr Kgosientsho “Sputla” Ramokgopa. They stated that other improvements to water and sanitation infrastructure in the area also occurred under the said administration. However, the participants stated that there was not much involvement by the community in any discussions around the development of the facility. It is evident from the state of the Leeuwkraal Dam water treatment facility and the Apies River that not much investment was made in educating the community about the dangers of pollution and infrastructure vandalism, and in ensuring that communities participate in the protection and conservation of water resources in Hammanskraal, particularly the Apies River that plays such a significant role in the township.

Resident H, who lives in an informal settlement in Carousel View, raised the concern that the small streams in his area receive their water from the highly polluted Apies River. Despite this, many residents collect water from these streams for domestic consumption. He stated that some of these individuals do not even have the ability to purify the water using the boiling method as they could not afford electricity and relied on paraffin stoves. And while paraffin was cheaper than electricity, at R25 or \$1.31 U.S dollars per litre in March 2023, it was still unaffordable for many. As such, many households in Carousel View opted to use the unpurified water as it is.



Figure 5.10: A resident of Temba collecting water from the Apies River

During the course of this study, the researcher spent weeks in Hammanskraal, during which time, important observations were made about the use of the flowing Apies River by residents of the township. In conversing with some of these residents, they indicated that they were collecting water for domestic use, though all of them stated that they would be boiling it before use. However, a group that was observed submersing itself in the water informed the researcher that their use of the river was for spiritual purposes. Resident G from Tamboville corroborated these assertions, stating that the Apies River had historically been used for ancestral and religious rituals by different religious groups, churches and individuals doing “*mesebetsi ya*

badimo” (the works of the ancestors). Some of these rituals, such as pouring “anointed oil” into the river, have contributed significantly to the river’s pollution.

According to participants N and P, who are officials in the City of Tshwane’s Department of Water and Sanitation, the most concerning and most significant impact of the pollution of the Apies River is that the Leeuwkraal Dam water treatment facility is struggling with the amount of pollution and sediments that are fed into it by the river. The water is so polluted that it is not possible for it to be treated adequately. As such, the water arrives at the Temba Water Purification Plant still greatly polluted. The treatment plant, due in large part to the fact that it is not well maintained, fails to completely treat and purify the sheer volumes of polluted water from the Apies River and Leeuwkraal Dam water treatment facility. They contend that this is the main reason that the water from the Temba Water Purification Plant reaches households in the deplorable state that it is in. The brownish and greenish colour of the water is from the sediments that come with it from Leeuwkraal Dam and Apies River, which are difficult to treat.

Participant O, who is also an official in the Department of Water and Sanitation in the municipality, stated that the pollution of the lack of infrastructure development at the treatment plants, including the Rooiwal Wastewater Treatment Plant, is a bigger threat to the water resources in Hammanskraal than the pollution of the Apies River. He stated that the Rooiwal Wastewater Treatment Plant is dysfunctional due to aging infrastructure and lack of adequate maintenance. The problem, he argued, is that the said plant presently services more than 40 percent of the population of the City of Tshwane, and the number is increasing as the city is experiencing an urban sprawl due to the growing number of informal settlements on the outskirts of established townships such as Hammanskraal and Soshanguve, as well as Mabopane, Winterveld and Ga-Rankuwa (which are collectively referred to as Mawiga). The participant argued that even if the Apies River was not as polluted as it currently is, the quality of water in Hammanskraal would still be poor due to these inadequacies in water infrastructure.

Participant T, a lecturer at the Tshwane University of Technology, stated that the pollution of the Apies River by members of the Hammanskraal community is the direct result of the failures of the government to prioritise environmental education not only in the said township but

across all of South Africa. He argued that many other water sources in the country such as Hartbeespoort Dam and the Vaal River are also battling with challenges of pollution caused by human activity. He stated that most of the pollution is plastic waste which is not naturally found in river and dam environments. This waste is introduced into the natural environment by human-beings who have no knowledge or understanding of the long-term effects of plastic waste on the environment and particularly in water resources. This line of reasoning is disputed by participants N and P, officials in the City of Tshwane's Department of Water and Sanitation. They contend that water pollution is not the result of lack of knowledge or understanding of its impact, but an illustration of a culture of disregard for the environment which is seen in the general state of townships and urban spaces.

5.5. DISCUSSION

To understand the nature of water governance challenges in Hammanskraal and South Africa broadly, it is important to understand that water governance is linked to overall failures of governance. This is to say that water governance is a microcosm of governance in general. These failures reinforce each other in complex ways that will be explored briefly. Specifically, there is an undeniable link between South Africa's ongoing electricity crisis and the exacerbation of its water security challenges. In fact, the South African Institution of Civil Engineering (2017) contends that the water resources sector is facing a crisis not too dissimilar to that faced by the electricity generation sector – and that with time, these challenges are becoming intertwined. According to NuWater (2023) the effects of loadshedding are especially pronounced and have far-reaching implications in the country's cities and towns. And although there are reservoirs providing backup water storage in these urban areas, the constant loadshedding affects the continuous flow of water that is required to maintain them. As a result, municipalities are not able to keep reservoirs full while treatment plants are operating, which results in water being distributed to household without being adequately treated as treatment plants are often off at the time of distribution (*ibid*). This is corroborated by Rand Water (quoted in Motsoere, 2023) which stated that it takes up to four hours to pump water at full capacity after a loadshedding cycle lasting more than two hours.

Linked to this is the fact that the water and sanitation infrastructure of a significant number of municipalities is distributed over long distances. This is especially the case in municipalities

such as the City of Tshwane that were established through the integration of various municipalities and councils. The political and administrative boundaries of the said metropolitan municipality is explained as follows:

“...The City of Tshwane boundary was further amended on 28 May 2008 through a proclamation in the Government Gazette that incorporated the former Metsweding District Municipality, including Dinokeng tsa Taemane (Cullinan) and Kungwini (Bronkhorstspuit), into the City of Tshwane. The incorporation, which took place in May 2011 after the local government elections, enlarged Tshwane to 6 345 km². Currently, Tshwane stretches almost 121 km from east to west and 108 km from north to south, making it the third-largest city in the world after New York and Tokyo/Yokohama. It also makes up more than 30% of Gauteng, which is 19 055 km² in extent...” (City of Tshwane, 2023)

In the City of Tshwane, a significant volume of the water is abstracted from dams such as the Leeuwkraal Dam in Hammanskraal. According to NuWater (2023) because the treatment plant, delivery pumps and households (consumers of the water) that the water is going to are located across wider distances, there is a possibility that these areas could have different loadshedding schedules. This creates logistical challenges for the municipality, making it difficult for sufficient water to be provided during periods of severe loadshedding. Furthermore, South Africa has been experiencing prolonged periods of loadshedding. According to BusinessTech (2023) loadshedding has being implemented on a near-permanent basis since the September of 2022, and as of the 23rd of June 2023, South Africa had experienced 173 days of loadshedding with it being suspended for just two days in that period. Understanding how loadshedding impacts on water infrastructure, it is evident that the strain on systems is causing mechanical failures which, according to NuWater (2023) not only cause additional downtime at water treatment plants and pumps but is also very expensive to repair.

According to the Western Cape Provincial Government (2023) not only does loadshedding affect water supply, but it also affects sanitation services. This is because pump stations that are used to treat waste at wastewater treatment plants run on electricity. As such, when there is loadshedding, the pumps cease to function, resulting in the spillage of sewage. And while some municipalities have mobile generators to power small pumps, these are inadequate as they do not have sufficient capacity, particularly when loadshedding is implemented at higher stages,

for longer than two hours at a time. The Western Cape Provincial Government further asserts that “with severe load-shedding, it becomes difficult to prevent overflows, in which case the operational teams do their utmost to contain and clean up such flows” (WCPG, 2023: 1). As with the downtime caused by loadshedding on water infrastructure, these waste overflows resulting from the impact of loadshedding on sanitation infrastructure also result in downtime and additional costs for the clean-up processes.

The South African Institution of Civil Engineering contends that even as the energy challenge does impact water provision, it is important to recognise that “it is also a crisis caused essentially by poor management at both national and local level – poor planning, unnecessary delays in implementation and a concerning decline in institutional competence” (SAICE, 2017: 21). The South African Local Government Association (2022) goes further to argue that lack of clear guidelines, frameworks and policies is also compounding the situation – an argument that is made in this study as pertains to the weaknesses in the synchronicity of water legislation.

High temperatures

Researcher at the Agricultural Research Council have noted that South Africa is experiencing unusual weather conditions and extreme weather patterns (Roffe and Patel, 2022). The argument that high temperatures in South Africa are leading to above average water use (du Plessis, 2022b) was also raised by residents of Hammanskraal who participated in this study. As stated in the previous chapter, the water availability challenges in the said township are particularly felt during the summer season that is characterised by very high temperatures and which has become increasingly prolonged over the years as the impact of climate change is felt in the southern hemisphere. Research indicates that the impacts of climate change are felt more in developing countries (European Parliament, 2007; Georgieva *et al.*, 2022; Mahlatsi, 2023d). In a study using the UrbClim numerical model to stimulate urban heat at a fast rate and high spatial resolution in metropolitan municipalities in the Gauteng Province, specifically the City of Johannesburg and the City of Ekurhuleni, to the south and south-east of the City of Tshwane, respectively, Souverijns *et al.* (2022) noted that the greatest heat stress is observed in high-density areas such as townships that are characterised by lower socio-economic conditions. The study also makes an important point about the spatiality of these areas, noting that it is devoid of vegetation which could lower the heat stress presently and in the future. This observation

was also made by Mahlatsi (2022b) who argues that townships were designed to house a reserve army of Black labour to work in the gold mines of the Witwatersrand, and not as places of recreation or places where families could thrive. She posits that the fact that suburbs are adorned with trees on the sidewalks and inside yards of all homes, while townships barely have any trees and vegetation coverage, is the direct result of apartheid spatial planning. All this provides scientific corroboration of the increasing heat in townships like Hammanskraal, which in turn leads to more water usage. However, as the township battles with lack of water availability, the situation is increasingly becoming volatile.

Quoting the study, titled *Urban heat in Johannesburg and Ekurhuleni, South Africa: A meter-scale assessment and vulnerability analysis*, Chambers (2022) notes that by 2050, summers in the Gauteng Province could be 3 degrees Celsius warmer than they are today. At this temperature, critical human functions including breathing will endanger the health of the province's residents, particularly in townships and other high-density areas. Residents of low-density areas will be shielded as temperatures are cooler in these areas owing to the presence of significant vegetation and spaciousness (*ibid*). For Hammanskraal, a township with a growing population and severe water insecurity challenges, this scenario is unthinkable. The township is already battling with outbreaks of cholera and other water-borne illnesses. In addition to this, the population is economically disenfranchised, with a significant proportion of it unemployed or relying on social grants for survival. These grants are below the inflation-adjusted national poverty lines, meaning that those who receive them, such as children and the unemployed, still live below the poverty line (Mahlatsi, 2021). Under these circumstances, the future scenario of rising temperatures would be especially catastrophic for Hammanskraal and other townships across the country.

Aging infrastructure

There is no question that aging infrastructure is the greatest contributor to the water insecurity challenges in Hammanskraal. Obuseng (2019), Mahlatsi (2023c), Mahlangu (2023) and Masilela (2023), among others, have demonstrated that many years of neglect and ignoring recommendations from experts have resulted in the crisis state that the City of Tshwane metropolitan municipality finds itself in with regard to water insecurity. A timeline of the problem indicates that water problems began in the early 2000s and that between then and the

cholera outbreak in 2023, the municipality had ample opportunities to introduce meaningful and long-lasting interventions, including the expansion of the Temba Water Purification Plant and the Rooiwal Wastewater Treatment Works plant.

In addition to its own internal reports on the need for infrastructure development and maintenance, professional institutions have also been raising alarm bells about the state of water infrastructure in the City of Tshwane. In 2017, the South African Institution of Civil Engineering (SAICE) released a report card that outlined the deterioration of water and sanitation services and infrastructure. According to the report, South Africa's infrastructure, including its water and sanitation infrastructure, is at risk of collapse due in great part to governance failures. The report goes on to argue that there is "widespread non-compliance with infrastructure asset management recommended practice" (SAICE, 2017: 23) and that among other things, this has resulted in funds that are allocated to new infrastructure investment by municipalities being used for unplanned repairs and replacement. South Africa's public infrastructure was awarded an overall grade of D+ (SAICE, 2017: 5) which is significantly lower than the global average and reflects "the continuing low maintenance levels, and even neglect in many areas, that is taking a toll on its resilience" as well as "a lack of commitment to long-term planning, adequate dedicated funding, proper management systems, data collection and skill deployment and collaboration are major contributing factors" (SAICE, 2017: 11).

5.6. ENVIRONMENTAL IMPACT OF POOR WATER GOVERNANCE IN HAMMANSKRAAL

The environmental impacts of water insecurity and failures of water governance in Hammanskraal are incalculable. While this study focuses exclusively on the township of Hammanskraal, the reality is that the entirety of the Tshwane region is affected by failures of water governance, which are closely linked to failures of environmental protection. Back in early 2021, the South African Human Rights Commission (SAHRC) conducted an investigation into the nature and extent of river pollution in the City of Tshwane, looking into allegations of the continuous spilling of raw sewage into several rivers including Roodeplaat River, Pienaars River and Walkerspruit River. Residents living in close proximity to these rivers had submitted complaints to the SAHRC detailing how the perilous state of the rivers had been

worsening over the years, negatively impacting on marine life. One of the residents, reflecting on the state of the Apies River, is quoted as saying: “The sad part is that the river provides water to the people of Hammanskraal and farmers. There are even dead fish coming from the river” (Germiston City News, 2021). The SAHRC report, titled *Report of the Gauteng Provincial Inquiry into the Sewage Pollution of the City of Tshwane’s Rivers and the Roodeplaat Dam*, was published eight months after it was commissioned. Part of the findings of the report stated that:

“...the Commission observed that the freshwater sources were being polluted, causing serious health risks. The Commission found that urgent work was needed at the Rooiwal WWTW [wastewater treatment works], as parts of it were non-functional, and it was unable to handle the recurring overflow of sludge from the lagoons (maturation ponds), and as a result poor quality, polluted effluent was being discharged into the Apies River...” (SAHRC, 2021: 32)

The environmental impact of the pollution of rivers in the City of Tshwane, including the Apies River, is the death of marine life, as stated by Germiston City News (2021). A study by the Institute for Water Quality Studies on fish kill that occurred in the Apies River in 2000 states that: “The low dissolved oxygen levels that were recorded at all three sites in the Apies River are indicative of water quality problems and the oxygen levels are low enough to be problematical to the survival of fish” (Hohls and van Niekerk, 2000: 3). The study goes on to state that if the temperature and dissolved oxygen readings that were taken during the investigation were the same as those during the previous days and weeks when the fish kill was observed by residents, then “it is expected that the fish would have been under stress and that would have made them more susceptible to additional stressors” (*ibid*). The findings of this study are in alignment with anecdotal observations by some participants of this study who had lived in Hammanskraal for a number of years, and who noted that the Apies River used to be teeming with fish, but that this fish was now completely depleted due to the severity of pollution and poor river maintenance on the part of the municipal government. They are also in alignment with the findings of the SAHRC on the state of rivers in the City of Tshwane, which posits that the pollution of the Apies River and other rivers within the municipal boundary have a catastrophic effect on the flora and fauna in the region. The report states that:

“The effects of the pollution on the water, its eco-systems and the people who use the water has been devastating. This is made clear by the Magalies Water Board’s water sample analysis carried out last year that showed horrendous levels of faecal coliforms and E. coli. Fauna and flora are dying or growing at an unhealthy rate, further polluting the water. People and animals who drink the water are vulnerable to illnesses such as bilharzia, cholera and hepatitis...” (SAHRC, 2021: 52)

In the previous chapter, the extent of the pollution of the Apies River is documented photographically and anecdotally. Tau *et al.* (2021) who conducted a study evaluating the pollution of the Apies River, concurred with the SAHRC’s findings, noting too the severe extent of the river’s pollution makes its water unfit for human consumption and poses a danger to human life. Despite the fact that the law as explored in Chapter 3 is clear on the need for all effluent to be treated before being discharged into receiving streams, empirical evidence demonstrates that there is an increase in the amount of pollution in the dams situated downstream of urban areas (Swatuk, 2010; Bamuza and Abiye, 2012). This is the case with the Leeuwkraal Dam that receives water from the Apies River in Hammanskraal. In their study on the auto-purification response of the Apies River to treated wastewater effluent, Omole *et al.* (2016) contend that the improvement of the natural auto-recovery process of the river is not possible without, firstly, the enhancing of the flow along the Skinnerspruit effluent stream through clearing of aquatic plants growing along the channel and secondly, the elimination of pollution activities upstream on the Apies River.

Beyond the impact on rivers, there are other environmental impacts of poor water governance in Hammanskraal that were observed. In the previous chapter, it was illustrated that as a result of the poor water quality and the cholera outbreak that hit the township, residents have come to rely on purified water sold in local spaza shops as well as bottled water. During several site visits, the researcher observed copious amounts of plastic bottles strewn across the streets of Hammanskraal. The effects of plastic waste disposal have been studied extensively by scholars such as Alabi *et al.* (2019), Ajaj (2022), Ajaj *et al.* (2022) and Gallagher (2023). There is common agreement between all scholars that Bisphenol A (BPA) and polyethylene terephthalate (PET), the kind of plastic that is used in the manufacturing of water bottles, generates large amounts of waste and carbon dioxide emissions due to the fact that the primary

component used to manufacture PET is petroleum. Gallagher (2023) argues that BPA has been shown to be a reproductive and developmental toxin in animals. Additionally, it is also an endocrine disruptor. The said hormone plays a crucial role in the human body. The endocrine system controls critical functions such as reproduction, metabolism as well as growth and development (National Cancer Institute, 2023). BPA mimics hormones that disrupt the endocrine system (Gallagher, 2023). Equally concerning is that results from a study by Josephson (2006) and Prins *et al.* (2018) indicate that exposure to BPA contributes to an increased risk in prostate cancer. Konkel (2013) also found that exposure to BPA can cause mammary tumours later in life.

In addition to this, sewage systems in urban areas, particularly in developing countries with infrastructure challenges, often become clogged with garbage. This was seen in Zambia where, according to the country's World Wide Fund for Nature, the 2018 cholera outbreak was associated with the clogging of stormwater drainage systems by plastic and other waste (WWF, 2018). Plastic-clogged sewage and stormwater systems attract harmful insects such as mosquitoes which spread diseases like malaria (Ajaj, 2022). According to Wakunuma (2021) women in developing countries are disproportionately affected by plastic waste. This is because beyond being exposed to chemicals in plastics that are linked to cancers and miscarriages, such as BPA, most waste-pickers are women and they work in unsafe areas on the outskirts of cities and towns where there are high crime rates. Additionally, the low-pay associated with waste-picking means women are unable to escape the cycle of poverty despite the labour-intensive work that they are engaged in. She goes on to argue that "many poorer women in African countries also reside in informal settlements, where waste easily accumulates due to poor rubbish collection services", resulting in colonies of very harmful bacteria.

Poor water governance in Hammanskraal also has a significant impact on the built environment in the township, particularly with regard to road infrastructure. In the previous chapter, the damage caused by water leaks and lack of stormwater drainage infrastructure is demonstrated photographically. Both tarred and untarred roads are affected, and potholes as well as depressions on these roads can be seen. A report published by the Council for Scientific and Industrial Research providing a technical guide to the causes, identification and repair of

potholes also notes that a lack of road and stormwater drainage infrastructure is the root cause of potholes in South Africa. According to the report:

“There is no doubt that water is the primary cause of potholes, with the access of water into the road structure to cause the potholes being mostly a function of the surface condition. A lack of periodic and/or preventative maintenance of roads often leads to the development of surface cracks, which allow rapid ingress of water into the structural layers during rainfall”.

(CSIR, 2010: 5)

The point that the CSIR makes about the lack of periodic and preventative maintenance of road infrastructure being at the centre of the perilous state of roads in South Africa is particularly pronounced in Hammanskraal. More than this, it is indicative of the layered failures of governance that are occurring in the City of Tshwane. As stated previously and alluded to by the South African Association of Public Administration and Management (2023) poor water governance in Hammanskraal and the City of Tshwane broadly is a microcosm of the general poor governance of the said metropolitan municipality. Poor water governance is both the result and the function of poor and weak governance.

Like other municipalities across South Africa, the City of Tshwane is faced with the challenge of low revenue collection for rates and taxes. There are several factors that inform low and no payment of rates and taxes by residents. In some cases, residents contend that they do not see the need to pay for rates and taxes when service delivery is so poor across the municipality (Sibiya and Moloji, 2024). According to the municipality, the revenue collection rate is on the decline, and as of August 2023, was at 76.08 percent (City of Tshwane, 2023). The municipality contends that the shortfall from revenue collection impacts adversely on its ability to meet its financial obligations, particularly for bulk supply creditors such as Eskom and Rand Water (*ibid*). The inability by the city to pay Rand Water impacts its ability to provide water to communities, which in turn exacerbates water insecurity.

5.7. ECONOMIC IMPACT OF POOR WATER GOVERNANCE IN HAMMANSKRAAL

Counting the economic costs of poor water governance in Hammanskraal and the City of Tshwane metropolitan municipality in general, is a Herculean task. The economic costs of poor water governance, which has exacerbated water insecurity challenges, cannot be adequately quantified due to the fact that the water crisis in Hammanskraal is still ongoing. At the time of writing this, in July 2023, the cholera outbreak that claimed several lives in the township has still not been fully contained. While cholera cases have been declining since mid-June 2023, Hammanskraal is not yet out of the woods. The Executive Mayor of the City of Tshwane, Cilliers Brink, is quoted by Goba (2023b) as saying that while the situation is not getting worse in that the cholera is no longer spreading, government still needed to determine the exact source of the bacteria for future prevention. By the Executive Mayors's own admission, this would not be extremely difficult. But while the cost of poor water governance cannot be accurately calculated, it is possible to explore areas where the impact is pronounced.

Economic impact on the fiscus

The financial impact of poor water governance by the City of Tshwane metropolitan municipality is evidenced in the amount of money that is being spent on constant repairs of the infrastructure, most of which is only temporary and has to consistently be repeated. This is aptly put by the current Executive Mayor, Cilliers Brink, who is quoted as saying that had the municipality implemented the recommendations of *Improvement of the Water Quality in the Hammanskraal Area Acceleration of Programme* that was adopted by the Mayoral Committee in 2011, as well as the 2004 Master Plan, both of which recommended the urgent upgrading of the Rooiwal Wastewater Treatment Works owing to it nearing its capacity, it would have cost the City at least R3 billion less than the current cost (Mahlangu, 2023). The report estimated that in the four years of the financial periods of 2011/2012, the upgrade of the Rooiwal Wastewater Treatment Works plant would have cost about R980m. According to Mahlangu (*ibid*) the multi-phase project to upgrade the treatment works will now cost the City of Tshwane, the national Department of Water and Sanitation and the water board, Magalies Water, an estimated R4 billion due to the exponential growth of the City's population in conjunction with the state of deterioration of the water and sanitation infrastructure.

The City of Tshwane's historical failure to prioritise the expansion and maintenance of the Rooiwal Wastewater Treatment Works and the Temba Water Purification Plant, as well as the

failure to monitor harmful economic activities in its key river systems, the Vaal, the Crocodile and the Olifants River systems, also means that treating water in the municipality has become more financially taxing. This is explained in the *State of Water in Cities*, which states that:

“...there needs to be a strategy to address the likely impacts of economic activities on freshwater ecosystems of activities such as mining which may be responsible for instance for the salinity observed in the Vaal, Crocodile and Olifants River systems. The treatment costs associated with water sourced from these systems would as a necessity rise if the drinking water quality is to meet the requirements...” (South African Cities Network, 2016: 10)

But treatment costs have not been the only fiscal impact of poor water governance. The City of Tshwane has had to procure the services of private companies to provide water to Hammanskraal and surrounding areas. According to the municipality, between June 2022 and April 2023, it paid more than R47 million to 103 water tank service providers (Chabalala, 2023). While this amount may seem reasonable, it is important to note that for about eight months in the 2018/2019 financial year, the municipality had taken over the function of water provision using its own water tankers. At this time, the municipality was paying R8 million for 27 tankers (*ibid*). This means that with private service providers, the municipality is paying just over R15 million more than it was paying when the service was insourced. Even accounting for the rise in fuel costs, the amount is still significantly higher.

The financial impact of corruption in the awarding of tenders for the upgrading of water and sanitation infrastructure in the City of Tshwane is also an important point to note. According to the municipality, the upgrades to the Rooiwal Wastewater Treatment Works were supposed to have been completed in May 2022. However, this was not done as the City had irregularly awarded the tender for the upgrades to a controversial company that did not finish the work despite being paid over R290 million (Chabalala, 2023). ActionSA, which is part of the Democratic Alliance-led multiparty government in the City of Tshwane, commissioned a forensic report into the Rooiwal Wastewater Treatment Works and found that the companies in the joint-ventured that had been awarded the R295 million tender to upgrade the said wastewater treatment works all belonged to a criminally charged individual and had no experience in a project of that magnitude (le Roux, 2023). Furthermore, the report found that five senior officials in the municipality played a central role in the awarding of the irregular

and illegal tender which flouted supply chain management procurement rules (*ibid*). This poor governance, enabled by lack of consequence management on the part of the City of Tshwane metropolitan municipality, resulted in the much-needed upgrades to the now full to capacity Rooiwal Wastewater Treatment Works being delayed, further deepening the water insecurity problem in a Hammanskraal that relies on water from the said wastewater treatment works.

Another impact of poor water governance on the fiscus of the City of Tshwane is linked to the poor management of consumption. This is a national issue. According to the Department of Water and Sanitation (2018: 12) despite the fact that South Africa is a water scarce country, the average usage of domestic water is estimated at 237 litres per person per day, which is significantly higher by 64 litres in comparison to the international benchmark of 173 litres per person per day. In the City of Tshwane, while this high level of consumption, which saw usage going from 640 megalitres per day to 717 megalitres a year ago, resulted in the introduction of water restrictions these were not applied with the necessary consistency (Mahlokwane, 2022). The result was that some areas had more water than others. According to the Department of Water and Sanitation (2018) the high consumption is partly attributed to high municipal non-revenue water, which stands at over 40 percent. This effectively means that more than 40 percent of water is lost due to leakages as a direct result of poor operation and the lack of maintenance of the existing aging water infrastructure, as well as commercial losses that are caused by meter manipulation and other forms of water theft (*ibid*). This failure of putting water conservation systems in place, as well as the state of water infrastructure, are a direct result of poor water governance and the impact on the municipality's fiscus arising from these problems is significant.

Economic impact on farming and food security

The water insecurity challenges and poor water governance in Hammanskraal and the City of Tshwane broadly has had a devastating impact on both commercial and subsistence farming. Over a period of more than a decade, commercial farmers who rely on the city's polluted and inadequate water resources have been hard-hit. According to a farmer who lives near the Apies River, Theunis Vogel, polluted water from the river has been contaminating his irrigation dam and borehole from as far back as the mid-2010s, which has cost him millions of Rands (Germiston Central News, 2023). An article published in *Farmer's Weekly* corroborated this

assertion, stating that farmers who are irrigating from the Apies River had experienced problems with sludge that was consistently blocking pumps and pivot sprinklers, and that the continuous replacement and repair of this equipment was costly to farmers and costing them millions (Mashala, 2011). The article also quotes a farmer who states that the water in the Apies River had been tested and declared unfit for purposes of irrigation (*ibid*). This was confirmed in a study by Oelofse *et al.* just a year later. The report to the Water Research Commission by Oelofse *et al.* (2012: iv) stated that due to water that is used for agricultural irrigation not being treated, crop yields are increasingly at risk due to the amount of pollution that is contained in rivers such as the Apies River. The South African Human Rights Commission *Report of the Gauteng Provincial Inquiry into the Sewage Pollution of the City of Tshwane's Rivers and the Roodeplaas Dam* (2021) also contends that the polluted water affects the groundwater and irrigation, and that the polluted water further affects crops and cattle which graze on the land affected by such water.

But commercial farmers are not the only ones affected by water insecurity and poor water governance in Hammanskraal and the broadly City of Tshwane. In the previous chapter of this study, an important point was made by resident E from Refentse (Stinkwater) who argued that lack of access to water meant that subsistence farming, which could alleviate food insecurity challenges, was not possible in the township due to the lack of reliable supply of water. The participant stated that some members of the Refentse community had contemplated the establishment of community food gardens but could not actualise this idea. Community gardens could play a crucial role in alleviating poverty in communities like Hammanskraal, just as they are in similar townships across the Gauteng Province. In his doctoral thesis where he analyses how the Community Work Programme (CWP) has contributed to the protection and promotion of livelihoods for the poor, Masondo (2018) contends that residents of Bekkersdal and Munsieville in the West Rand of Gauteng augmented their stipends from the CWP with vegetable gardens, which helped to alleviate hunger within the said communities. Without a reliable supply of water, and the water distributed from the Temba Water Purification Plant being unfit for domestic use, the residents of Hammanskraal are unable to benefit from similar community initiatives.

Economic impact on tourism

Discussions about the economic impact of water insecurity and poor water governance in Hammanskraal rarely focus on tourism and yet, this is one of the most affected industries. According to Ash (2021) the raw sewage that is flowing into Roodeplaat Dam from the Pienaars River and the invasive water hyacinths have made the dam unusable for purposes of recreation. This has affected recreational offerings and resorts around the area. An individual who owns a resort near the Roodeplaat Dam stated that due to lack of maintenance by the City of Tshwane metropolitan municipality, hyacinths now cover nearly half of the water at the dam, stating: “On the 460ha dam, that means more than 200ha is covered” [in invasive hyacinths] (Ash, 2021). The impact of this is that guests to the resorts in the city can no longer enjoy aquatic activities that they used to, which has an impact on occupancy rates of resorts and guest houses in the region. This impact is also being felt in Hammanskraal. As stated in the previous chapter by residents B and D who are lifelong residents of Temba, the Apies River used to be a site for recreational activities. However, pollution by residents as well as the state of the river owing to the effluence flowing in it has made the site unusable. This is further corroborated by the South African Human Rights Commission’s *Report of the Gauteng Provincial Inquiry into the Sewage Pollution of the City of Tshwane’s Rivers and the Roodeplaat Dam* which states that: “The polluted water affects the groundwater and irrigation with the polluted water further affects crops and cattle which graze on the land affected by such water. The sewage pollution means that the water can no longer be used for water sports and as a tourist attraction” (SAHRC, 2021a: 52). The impact is significant in a region where tourism is already limited.

Economic impact on livelihoods of residents

The water security challenges and poor water governance in Hammanskraal has impacted significantly on the livelihoods of residents. In the previous chapter, a participant named resident J who runs a spaza shop (informal small business) in the Kanana section of Hammanskraal stated that the lack of water availability has affected her meagre profits as she has to use them to purchase purified water that is needed to cook. Undoubtedly, other businesses in the township, particularly small, medium and micro enterprises (SMMEs) are also affected. While its focus is on the city of Maun in Botswana, a study by Selelo *et al.* (2017) found that extended water supply disruptions significantly impact the operations of SMMEs, with respondents indicating that their monthly returns and overall profits were affected. The study contends that the same results have been observed across developing countries.

5.8. CONCLUSION

This chapter provided results and a comprehensive discussion on water governance challenges in Hammanskraal. But while most of the available data on water security challenges in the City of Tshwane broadly largely focuses on the environmental and economic impact of poor water governance, there has not been a great focus on the ways in which water is shaping the politics of Hammanskraal. Koren *et al.* (2021) argue that water insecurity can be a cause of social unrest. And although there is an understanding that water insecurity alone is rarely the cause of conflict, but a contributing factor on the back of other socio-economic challenges and risk (Gleick and Iceland, 2018) there is certainly a new urgency around water crises. In the case of Hammanskraal, we also see the ways in which water governance directly informs electoral futures and by extension, political governance. There is an argument to be made that by withholding their votes for the African National Congress which had governed the City of Tshwane metropolitan municipality since its inception in 2000, as evidenced in the 2021 local government elections (Independent Electoral Commission, 2021; Mkhize *et al.*, 2021) the residents of Tshwane in general and Hammanskraal in particular, shaped the very nature of political administration in the administrative capital of South Africa, ensuring that the municipality ceases to have a dominant party-political system and transitions instead to a multi-party political system.

While South Africa is a water scarce country and is not immune from the impact of climate change and related ecological realities, the water security challenges in Hammanskraal are fundamentally the result of decades of poor water governance on the part of the municipal government. The intentional delays in the implementation of recommendation to upgrade and expand various wastewater treatment works is at the heart of the ongoing water crises that face the City of Tshwane in general and the township of Hammanskraal in particular.

CHAPTER 6: RECOMMENDATIONS AND CONCLUSIONS

6.1. INTRODUCTION

The most significant value of scientific research is that it aids researcher and society at large to make critical new discoveries about phenomena. Despite the fact that scholars such as Pernegger and Godehart (2007) have made a case that townships are largely, but not exclusively, an urban challenge, there is limited scholarship on certain aspects of township geographies and geo-histories. Hammanskraal, despite having one of the most profound water insecurity challenges in South Africa, with a barometer that can be traced back to almost two decades, is grossly under-studied in terms of its water challenges. Studies that have been conducted on the water challenges of Hammanskraal, such as Baloyi and Diamond (2019) and Tau *et al.* (2021), focus almost exclusively on the physical characteristics of its water quality. While this is certainly important, it does not provide a qualitative analysis of the experiences and interpretations of the residents of Hammanskraal, in relation to the water insecurity. This analysis helps us to make sense of how inequities in water allocation and distribution, as well as in water governance, contribute to and exacerbate water insecurity. This study sought to address this gap, cognisant of the layeredness of water insecurity challenges in South Africa in general.

Hammanskraal was a particularly significant case study because townships are important in the discourse on redress, which is central to water legislation in South Africa. As outlined in chapter 3 of this study, all key water legislation is anchored on the Constitution of the Republic of South Africa Act 108 of 1996, the cornerstone of which is the question of redressing injustices of the past. According to Jegede and Shikwambane (2021) the Constitution does this by informing instruments and measures such as free basic water policy. Hammanskraal, a township born out of what Berlanda (2017) terms “exclusion by design”, is an important case study precisely because understanding how areas designed for the purpose of excluding and marginalising substantial numbers of South Africans provide us with a starting point in designing and developing strategies supporting their re-integration into the wider urban and social fabric (Pernegger and Godehart, 2007). This re-integration is especially important in the context of the intensification of global warming and climate change that is necessitating the resilience on the part of developing nations such as South Africa. Building and strengthening

this resilience demands, above all else, re-engineering urban spatialities that have historically been rooted in exclusion and underdevelopment.

6.2. SUMMARY OF FINDINGS

The study sought to provide an analysis of the equity dimensions and governance drivers of water insecurity challenges in the township of Hammanskraal, located in the City of Tshwane metropolitan municipality. The summary of findings of the study are based on the three research objectives that are outlined in Chapter 1, and are outlined as follows:

Objective 1: To analyse how and why water insecurity has manifested in Hammanskraal, City of Tshwane.

The study found that while water insecurity challenges in Hammanskraal are rooted in complexities of contemporary society, they are historical in nature and can be traced back to the legislative constructs of the colonial and apartheid dispensations. According to Tempelhoff (2017) the legislative framework related to water has historically shaped the prevailing economic, socio-economic and political realities of South Africa. During the colonial and apartheid dispensations, water provision was not a government function, resulting in significant deprivation for marginal communities, particularly Black people in rural areas which later became homelands (Jegade and Shikwambane, 2021). Hammanskraal, having been part of the Bophuthatswana homeland that was established in the 1970s, was significantly impacted by segregationist policies that facilitated spatial underdevelopment and uneven development. This included water policies that did not prioritise the development of water infrastructure in the homelands where Black people had been hurled to, laying the foundations for water insecurity that would become especially pronounced in townships and rural areas in the democratic dispensation (Tempelhoff, 2017; Department of Water and Sanitation, 2018).

Though having their foundation in historical constructs, the water insecurity challenges in Hammanskraal became significantly amplified in 2005, just over a decade after the end of apartheid and half a decade since the establishment of the City of Tshwane metropolitan municipality. It was in 2005 that residents of Hammanskraal began to experience water

shortages, beginning with intermittent availability and culminating into complete unavailability (Evans, 2021a). Since then, the water insecurity challenges have become amplified and in 2023, the most severe manifestation of the problem was experienced when Hammanskraal became the epicentre of a cholera outbreak that devastated the township, resulting in numerous deaths and hospitalisations (Department of Health, 2023; Sobuwa, 2023). And while, as of June 2023, there has not been a report on the exact cause of the outbreak, the Department of Water and Sanitation and scientists have indicated that the deteriorated state of the Rooiwal Wastewater Treatment Works and the Temba Water Purification Plant, as well as the pollution of the Apies River, were the most likely causes of the outbreak (Kretzmann, 2023). This is also corroborated by residents of Hammanskraal who participated in this study and indicated that the water from their taps had been making them unwell for some time.

Water insecurity in Hammanskraal has manifested in various ways, one of which has been the complete lack of water availability that has led to social unrest. Kajee (2019) posits that community protests and uprisings about lack of water in Hammanskraal have increasingly become violent, with law enforcement increasingly resorting to the use of violent force to disperse residents when they protest. Another way in which water insecurity has manifested in Hammanskraal is in the complete deterioration of freshwater sources including rivers, reservoirs and wetlands. As with the deterioration and decline of wetlands globally (Ramsar Convention on Wetlands, 2018), there has been a critical depreciation and degeneration of wetlands in the City of Tshwane. According to Mike Mkhari, the former Member of the Mayoral Committee for Environment and Agriculture in the said metropolitan municipality, for many years, the residents of Tshwane had regarded wetlands as wastelands, failing to understand their critical importance (Infrastructure News, 2018). Another freshwater resource that has been particularly affected by deterioration is the Apies River, which is an important source of water in Hammanskraal. A study by Tau *et al.*, (2021) outlines the complete state of degradation of the Apies River, deeming its water harmful for both consumption and irrigation.

The most glaring manifestations of water insecurity in Hammanskraal are the economic, socio-economic and socio-political impacts that the problem is having on residents of the township. Water insecurity in Hammanskraal is negatively impacting on the residents' capacity for livelihood generation, which is especially calamitous given the socio-economic profile of the

township that is characterised by high levels of unemployment, poverty and hunger (Mitchley, 2021b; Mudau and Mahlatsi, 2022). Water insecurity in Hammanskraal has also manifested in environmental degradation evidenced in plastic waste pollution.

Objective 2: To assess the equity dimensions of water insecurity in Hammanskraal, City of Tshwane.

This study found that there are problems of equity when it comes to water security in Hammanskraal. These are outlined below (Figure 6.1):

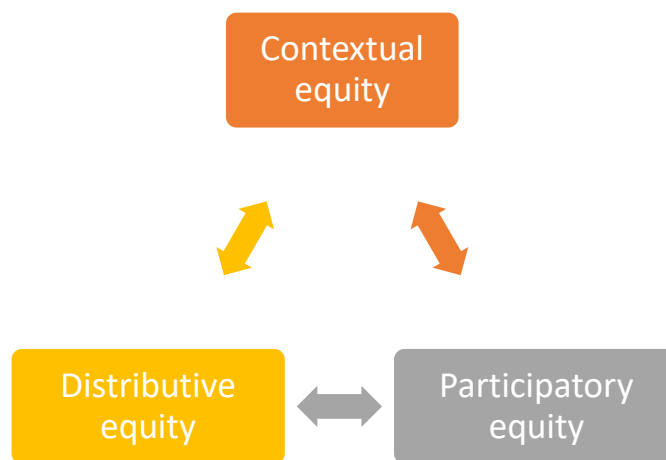


Figure 6.1: Equity dimensions of water insecurity in Hammanskraal

Contextual equity

There is a social, technological, economic, environmental, political and historical context in which water insecurity occurs in Hammanskraal. As outlined in the summary of findings for Objective 1, the **historical** and **political context** in which water insecurity occurs in Hammanskraal can be traced back to the colonial and apartheid eras where policies that facilitated spatial inequities and uneven development resulted in the deprivation of water resources for Black people living in rural areas and homelands such as Bophuthatswana, which Hammanskraal was part of (Jegede and Shikwambane, 2021). This has informed the contemporary **social** and **technological context** in which water insecurity occurs in the post-apartheid dispensation. The context is that of aging water infrastructure, with critical infrastructure such as the Rooiwal Wastewater Treatment Works having been built in the 1960s for a much smaller population than the City of Tshwane currently has owing to migration into

the industrialised Gauteng Province (Mahlangu, 2023; Mahlatsi, 2023c). The lack of advanced technological development has hindered the capacity of the City of Tshwane metropolitan municipality to arrest the decline in its water infrastructure and management systems.

The **environmental context** is linked to this migration. The exponential increase in the population of Hammanskraal and the City of Tshwane broadly has placed a significant burden on the region's water resources. The Organisation for Economic Co-operation and Development contends that "as economies and populations grow, so will the assets, economic activities and populations facing water risk" (OECD, 2016: 1) and that the rapid growth in populations and urbanisation in developing countries is placing a huge strain on water resources. In addition to this, the impact of climate change on water resources in South Africa has also been significant. According to the UNU-WIDER (2016) climate change has a significant impact on the water resources of South Africa, evidenced in increased flooding and drying and other strong localised effects. This is seen as particularly concerning owing to the minimal water resource management systems in the country.

The **economic context** in which water insecurity is occurring in Hammanskraal is one of extreme inequalities that manifest in unemployment, hunger and poverty. According to Wereldkinderen (2023) the people of Hammanskraal face extreme poverty and live in the most vulnerable conditions which are characterised by lack of access to basic services including water and sanitation. This situation has been worsened by the perilous state of the municipality's finances. The City of Tshwane is effectively bankrupt, with its liabilities exceeding its assets by more than R3 billion according to the National Treasury (Moatshe, 2021) and the Auditor-General having made seriously adverse findings against the municipality whose financial health is in peril, with over R10 billion in irregular expenditure (Steyn, 2023). Under such conditions, the municipality does not have sufficient capital expenditure to prioritise water infrastructure development, while the majority of residents do not have the necessary financial resources to sustain resilience in the face of the ongoing water challenges.

Participatory equity

It has been argued that the poor and most marginalised people in society lack a sense of participatory equity – a sense that they belong to their society and have inalienable human rights that are accorded to those of higher social and economic standing. According to Basu (2006) one of the impacts of this denial of participatory equity is that those who are on the margins tend to become disgruntled and desensitised to a point of giving up and completely withdrawing from political and social participation. Baku (*ibid*) goes on to argue further that when people are integrated into a community and have a sense that they are valued, they become more productive members of society. He contends that one of the limitations of economics literature is the failure to recognise that integration and participation are instruments of economic development. This is an important analysis that emerged in this study in relation to the residents of Hammanskraal. The study found that there is no participatory parity in the township in so far as who sits on the table when decisions about water are being made. Since 2004 when the City of Tshwane metropolitan municipality first developed a Master Plan that looked into the development of water infrastructure, there has been no involvement of the community in terms of shaping policy. The said Master Plan, and subsequent Master Plans, were developed by the infrastructure department of the municipality (Mahlangu, 2023) with no input from affected communities and very minimal input from non-state actors involved in water security work.

While government practitioners tend to argue that communities are involved in decisions of municipalities due to their participation in Integrated Development Planning (IDP) processes, which are a legal requirement for municipalities, this is debatable. For one thing, an IDP, which is effectively a comprehensive outline of a municipality's objectives, has a lifespan of five years, which is the amount of time a political administration has in office (Parliamentary Monitoring Group, 2022). But despite the fact that they are supposed to be the cornerstone of participatory democracy, IDP processes are seen as exclusionary and nothing more than a box-ticking exercise by some scholars and practitioners of local government. Some scholars have argued that “there is a lack of adequate requisite knowledge and understanding of the strategic nature of the IDP, as well as a lack of competences for the public to meaningfully participate” (Sibanda and Lues, 2019: 78). In addition to this, their study also found that some residents are excluded from participation in IDP due to their political affiliation. According to Mamokhere and Meyer (2022) this exclusion is also the direct result of government officials who are responsible for the development of IDPs not encouraging communities to participate in the

process. But even for the community members who do manage to participate, there are existing power dynamics that make their participation limited. These power dynamics result in the marginalisation of those with less powerful interests (Sibanda and Lues, 2019) as well as those who do not have the requisite education and aptitude to make sense of the legal complexities involved in IDP development.

This study demonstrated the ways in which Hammanskraal residents do not enjoy participatory parity, and how the government uses community engagement as a damage control mechanism rather than a consistent vehicle for participation. This was evidenced with the way government officials did not attend timeously to protests about water challenges as far back as 2019 but opted instead to unleash law enforcement on protesting residents (Kajee, 2019). However, as soon as there was a cholera outbreak in the community in May 2023, an outbreak resulting from almost two decades of water insecurity challenges that had gone unresolved, the national, provincial and municipal government facilitated community meetings to discuss the water challenges that had been ongoing since 2005. Having attended one of these meetings, the researcher noted the clear power relations between residents of the Hammanskraal community and government officials. These were manifested in things such as the use of technical language, and even the very use of the English language in a township that is comprised of more than 99 percent of Black people who all speak indigenous languages (Statistics SA, 2011). Additionally, the Minister of Water and Sanitation arrived in Hammanskraal with an entourage of private security, creating a separateness that covertly communicated the lines of authority to the residents.

It was also noted that the community meeting started later than scheduled due to the late arrival of the Minister and other government officials. By this time, some residents had left the meeting venue, indicating that they were unable to participate on account of this lateness. The late start of the meeting also likely excluded women in particular as they may have reasonably stayed home due to security concerns given the high rate of violent and sexual crimes in Hammanskraal. The Temba Police Station in Hammanskraal is ranked in the top ten of reports for sexual offenses by the Crimes Statistics Report for the 2020-2021 (South African Police Service, 2021: 54). In addition to this, the cholera outbreak and subsequent community

meetings to report on it occurred during one of the worst load-shedding periods in the country, adding to the likely security concerns of women.

Distributive equity

This study found that there is an uneven distribution of water resources not only at a global scale but also nationally. According to Dr Ferrial Adam, Water and Environment Manager for the Community Action Network (quoted in Ntengento, 2023) at the centre of the distributional inequities in South Africa is the deterioration of water infrastructure at a local or municipal level that is leading to people not having sufficient water. In Hammanskraal, this distributional inequity finds expression in two specific ways. Firstly, different areas within the same township experience water insecurity in different ways. As the study shows, there are some areas in Hammanskraal that do not have any clean drinking water at all, and some that do have water. This is based on which water board is providing the water (Department of Water and Sanitation, 2023h). Within Hammanskraal, some areas completely rely on water provision from the municipality, while other have water coming out of their taps. But even this has its challenges because some of the water is safe for consumption while in other areas, water does come out of the taps but it is not fit for human consumption or any domestic use. The second element of this distributional inequity is at a household level where some households have the resources to access alternative water while other do not have this capacity. This results in a situation where there is an uneven capacity for resilience at the most basic level (households).

Distributional inequity in Hammanskraal is also a function of geo-history and geography. As indicated in the interviews conducted, some of the most affected areas in terms of lack of water provision are informal settlements within and on the outskirts of the township. Residents of Hammanskraal who live in informal dwellings, even when these are in close proximity to formal settlements, often do not have access to tap water, and thus rely on the municipality's provision at water distribution points as well as from their neighbours in formal dwellings. In some cases, residents on the outskirts who do not have access to clean drinking water rely on water from rivers and streams, which is severely polluted and not fit for human consumption and in some cases, irrigation (Hohls and van Niekerk, 2000; Mashala, P, 2011; Tau *et al.*, 2021). This deepens general inequalities where the poor are most affected by water insecurity.

A final aspect of distributional inequity that was noted in the study pertains to the fact that industries such as agriculture continue to have a disproportionate share of water access. According to Schreiner (2013) patterns of distribution have not changed since apartheid, where commercial farmers had more access to water than communities. Significantly, this access is also defined along racial lines, with Black commercial farmers having less water access than White commercial farmers.

Objective 3: To explore the governance drivers contributing to water insecurity in Hammanskraal, City of Tshwane.

In 2004, a year prior to the beginning of the water problems in Hammanskraal, the City of Tshwane metropolitan municipality had already developed a Master Plan that indicated that the Rooiwal Wastewater Treatment Works was reaching its full capacity and that water infrastructure across the metro needed to be upgraded and expanded (Mahlangu, 2023). In November 2011, the Mayoral Committee adopted a report titled *Improvement of the Water Quality in the Hammanskraal Area Acceleration of Programme*. Like the 2004 Master Plan, the report raised the alarm about the state of water infrastructure in the City of Tshwane, with an extensive focus on the Rooiwal Wastewater Treatment Works and the Temba Water Purification Plant. In 2015, the *Tshwane Water and Sanitation Master Plan* was developed. This too, like the previous plans and reports, gave particular attention to the above-mentioned wastewater treatment facilities. The recommendations in all these reports and Master Plan were pellucid: in order to avert a water and sanitation crisis, the City of Tshwane metropolitan municipality needed to invest in the upgrading and expansion of Rooiwal Wastewater Treatment Works and the Temba Water Purification Plant, and to invest in the cleaning of the municipality's rivers and dams, with Apies River as one of the key focus.

From 2000 to 2023, various scholars and research institutes had also produced significant research on the state of water and sanitation, as well as the state of rivers and wetlands in Tshwane, contending that these were laying the foundation for a water crisis (Hohls and van Niekerk, 2000; Tau *et al.*, 2021). The Auditor-General of South Africa had also released a consolidated report on the audit-outcomes of water boards in the country. This report expressed

concern about the governance and general state of water boards, noting that “key objectives as set out in this plan, including providing quality water, reducing water losses, increasing investment, and upgrading and maintaining infrastructure assets, were not always achieved as reported in the annual performance plans” (Auditor-General of South Africa, 2022: 4). Despite all these concerns, and the multitudes of Master Plans that had been developed and adopted by the City of Tshwane metropolitan municipality, an audible silence was maintained that ultimately resulted in the ballooning of costs needed to upgrade and expand the water infrastructure (Mahlangu, 2023) – costs which the municipality on its own cannot shoulder due to its state of financial peril as outlined earlier in this chapter.

This study has demonstrated that poor water governance is at the centre of the ongoing water security challenges in Hammanskraal. Poor water governance is not only responsible for the deteriorating state of water infrastructure which has been ignored for more than two decades, but it is also responsible for the 2023 cholera outbreak that devastated the township. This is captured aptly by the South African Human Rights Commission whose investigation into the sewage pollution of the freshwater resources in the City of Tshwane found that poor governance is the main contributing factor to the pollution of the rivers and dams within the municipal boundary. Having stated other factors, the report states that:

“The primary reason for the unacceptable levels of pollution is the failure to manage and maintain existing WWTWs in the City of Tshwane over a prolonged period of time. Failures in management which have resulted in a regression in standards of delivery, include poor planning and implementation evidenced by the insufficient number of WWTWs to accommodate the growing population in the City of Tshwane.” (SAHRC, 2021a: 52)

Poor water governance is not only evidenced by the state of water infrastructure and water resources, as well as the failure to implement recommendations on water infrastructure development, but it is also evidenced by the corruption that characterises water infrastructure projects in the City of Tshwane. This study illustrated how the municipality awarded an irregular and illegal tender worth hundreds of millions of Rands to companies owned by a compromised and criminally charged individual, companies which did not possess the requisite skills, experience and competencies for a project the magnitude of the upgrading of the Rooiwal Wastewater Treatment Works (le Roux, 2023). This flouting of procurement processes that

occurred in the City of Tshwane had devastating consequences as the upgrades on the said wastewater treatment plant were not done, ultimately worsening a problem that was already at crisis level.

6.3. RECOMMENDATIONS

The following are the proposed recommendations for resolving the water insecurity challenges and poor water governance problems in Hammanskraal, and the City of Tshwane broadly.

6.3.1. Upgrade of the Rooiwal Wastewater Treatment Works and expansion of Temba Water Purification Plant

This study has demonstrated that poor water governance is the primary cause of water insecurity challenges in Hammanskraal and the City of Tshwane broadly. Specifically, it has demonstrated that the main source of the ongoing water challenges is the aging water infrastructure that has reached its full capacity owing to the exponentially increasing population and lack of adequate maintenance. For this reason, the most urgent intervention that the metropolitan municipality needs to make is to upgrade the Rooiwal Wastewater Treatment Works and to expand the Temba Water Purification Plant.

The Rooiwal Wastewater Treatment Works is ground zero for the water insecurity challenges in Hammanskraal. The plant was built in the 1960s for a much smaller population than is currently living within the municipal boundary of the City of Tshwane. Despite this significant limitation and the fact that as far back as 2004, the municipality was aware that it was nearing full capacity (Mahlangu, 2023) it is presently servicing more than 40 percent of the City's population (Mahlatsi, 2023c). The result of this is that Rooiwal lacks the capacity to purify wastewater, which is causing the accumulation of sludge that is being discharged into the Apies River in large quantities. The result of this is that the Leeuwkraal Dam receives highly contaminated and waste-filled water from the Rooiwal Wastewater Treatment Works, and also has no capacity to purify this water before it is discharged to the Temba Water Purification Plant, the final stop before it is distributed to households in Hammanskraal. The City of Tshwane must upgrade the Rooiwal Wastewater Treatment Works by increasing the capacity

of the primary settling tank and increasing the number of digesters at the plant. This would ensure that the said wastewater treatment plant has sufficient capacity to carry wastewater and to purify it. In addition to upgrading the Rooiwal Wastewater Treatment Works, an expansion of the Temba Water Purification Plant is highly recommended. Part of this expansion must include increasing the number of reservoirs at the facility. The construction of a 55 megalitre reservoir would alleviate the water availability challenges that compound the quality of untreated water from Leeuwkraal Dam. This will go way in ensuring a reliable security of water supply to Hammanskraal and parts of neighbouring townships such as Soshanguve.

Linked to the expansion of the Temba Water Purification Plant is the need to ensure that the water it receives from Leeuwkraal Dam and water treatment facility is adequately treated and has minimal contamination. In the study titled *Determination of groundwater-surface water interaction, upper Berg River catchment, South Africa*, it is argued that “infiltration of surface water and discharge of subsurface water transfers the respective chemical signature of the contributor, meaning that the transfer of water of suitable quality will reduce contamination in the receiving water body” (Madlala, 2015). Two important interventions must be made to ensure that water received at the Leeuwkraal Dam is minimally contaminated. The first and most significant is the upgrading of the Rooiwal Wastewater Treatment Works as outlined. The second is the dealing with pollution at the Apies River. The two are linked in that sludge from the Rooiwal Wastewater Treatment Works is deposited into the Apies River, but there are other sources of pollution of the river including the use of pesticides, insecticides and fertilisers that are deposited into the river. This fertiliser and chemical runoff, which is largely the result of agricultural activities along the Apies River, is a significant source of the river’s contamination. Solutions on dealing with the fertiliser runoff problem can be transposed from countries and states that have managed to resolve the problem. In this case, the state of Iowa in the United States of America is an important point of reference.

For many years, the state of Iowa, which is regarded as one of the United States’ most important farming states and is also the second-largest contributor of nitrates to the Gulf in the Mississippi River Basin, the largest drainage basin in the United States, was confronted with the challenge of fertiliser runoff being deposited into its rivers and streams, compromising the quality of the state’s water resources (Royte, 2017). However, in 2014, the state developed a comprehensive

Nutrient Reduction Strategy, a science and technology-based framework that is aimed at assessing and reducing nutrients in Iowa's water resources. The key recommendation of this strategy, which is relevant to the Apies River and other rivers within the City of Tshwane municipal boundary, is the reduction of nitrates in the river by at least 41 percent. The three most important tools that are outlined by the strategy include the application of fertilisers at a more reduced rate, the planting of cover crops and allowing strips of farmland to revert to unfertilised prairie (State of Iowa, 2014). While these interventions are voluntary in the context of the state of Iowa, it is recommended that in South Africa, they are made legal requirements. This can be achieved by the national Department of Water and Sanitation issuing a statutory instrument that is anchored on existing legislation.

6.3.2. Investment in alternative water sources and tools for water conservation

One of the major challenges confronting the City of Tshwane metropolitan municipality is the lack of a water resource management strategy that factors in the present and future realities of water scarcity in the Gauteng Province. The exponentially increasing population and economic growth in the broader Gauteng City Region means that the demand for water is exceeding supply by a significant margin in the short-term. The implication of this is that unlike in the Western Cape and other provinces where water scarcity has been driven largely by droughts, in the Gauteng Province, water scarcity is occurring outside periods of extended droughts (Gauteng City Region Observatory, 2019). To be able to maintain a reliable supply of water even during droughts, the City of Tshwane must develop a comprehensive and updated water resource management strategy that will utilise tools for monitoring water availability.

In addition to this, there must be an investment in alternative water sources and tools for water conservation. The City of Tshwane, like other municipalities in the Gauteng Province, rely significantly on the Integrated Vaal River System (IVRS) for its water supply. While the IVRS has been able to maintain a strong position over the years, with critical dams maintaining stable levels of water availability (Infrastructure News, 2022) one of its major water sources, the Vaal River, is in a precarious state. According to a case study on the pollution of the Vaal River system, the deteriorating wastewater treatment system in the catchment area has led to the severe pollution of the river (Mnguni, 2022). Over the years, the sewage has been seeping into the Vaal River. So significant is the problem that in 2020, the South African Human Rights

Commission instituted an inquiry into the pollution of the Vaal River. The report from that commission, titled the *Final Report of the Gauteng Provincial Inquiry Into the Sewage Problem of the Vaal River* was released in February 2021. The report states that “the Vaal is now polluted beyond acceptable standards, and that the cause is the kilolitres of untreated sewage entering the Vaal because of inoperative and dilapidated wastewater treatment plants which have been unable to properly process the sewage and other wastewater” (SAHRC, 2021b: 2). This is a clear indication that the IVRS is not immune from the poor water governance challenges confronting the City of Tshwane, and as such, is likely to present significant challenges in the future. It is for this reason that alternative water sources and tools for water conservation are recommended for dealing with the water insecurity challenges in Hammanskraal.

According to the Gauteng City Region Observatory (2019: iv) alternative water sources that must be explored by municipalities in the Gauteng Province include rainwater, groundwater, stormwater and reuse of wastewater and treated acid mine drainage (AMD). The latter is particular important due to the fact that a significant volume of groundwater resources in the Gauteng Province has been contaminated by AMD. The American Geosciences Institute (2023b) there are a variety of ways to treat water that is affected by AMD. These include the reclamation of contaminated land through the application of alkaline materials to neutralise the acidity of the water as well as the modification of slopes in order to minimise the infiltration of surface water into underlying contaminated material (*ibid*). Other methods include the relocation and isolation of mine waste.

It is also recommended that the City of Tshwane invest in rainwater harvesting technologies in order to collect and efficiently store rainwater from basement areas such as the rooftops of residential buildings, ground surface and rock catchments. In their study on smart rainwater management, Pradhan and Sahoo (2020) contend that harvested rainwater, when done through smart technologies, is not only sustainable but it is also much safer to use and has minimal bacterial properties in comparison to water collected from ground catchments. At the heart of this recommendation an appreciation of the financial position of the City of Tshwane metropolitan municipality which, as indicated in this study, is dire. Rainwater harvesting technologies are relatively cheap while also maintaining durability. In addition to this, storing this rainwater will achieve three important things. Firstly, it will reduce surface runoff which

this study has proven can exacerbate damage to road and stormwater infrastructure. Secondly, because this harvested water is captured in reservoirs, the problem of flooding during heavy rainfall is eliminated. And thirdly, it prevents the overuse of underground water. According to Pradhan and Sahoo (*ibid*) pumping water from underground is not only more expensive but it also depletes groundwater resources that are already under stress due to growing urban populations. Rainwater harvesting technologies will thus save the municipality financial resources that can be directed towards other recommended interventions such as the upgrading and expansion of wastewater treatment works and purification plants.

6.3.3. Setting of water allocation ceilings in Gauteng municipalities

It has been established that South Africa is a water scarce country and that different regions across the country have specific challenges with regards to water supply. Water insecurity is not unique to the City of Tshwane. Over the years, various metropolitan municipalities including the City of Cape Town, Nelson Mandela Bay Municipality and the City of Johannesburg have been confronted with their own water insecurity challenges. Between 2016 and 2018, the City of Cape Town was faced with a drought so severe that it brought the city to the brink of Day Zero, a day in which taps would run completely dry (Heggie, 2018). According to a documentary aired by National Geographic (2018) the city was poised to become the first major city in the world to run out of water. And while the potential crisis was ultimately averted, there were some important lessons that emerged from it. One of these was the importance of utilising water restrictions as a way of protecting and ensuring the security of water supply.

During the said water crisis in Cape Town, the municipal government placed limitations on water use. Individuals were only allowed no more than 50 litres of water per day, an intervention which, coupled with favourable rainfall, prevented Cape Town from plunging into Day Zero (Wingfield, 2023). Through placing water restrictions for households and businesses, the City of Cape Town was able to slowly stabilise its water supply to a significant degree. Just four years later, in 2022, Nelson Mandela Bay Municipality (NMB), one of two municipalities in the Eastern Cape Province, was also faced with an imminent Day Zero. In August of that year, the dams supplying water to NMB had were sitting at 11 percent storage owing to a persistent drought and high water consumption (Dayimani, 2022). In both cases, the crisis was averted through the introduction of water restrictions.

The key lesson from Day Zero scares in the City of Cape Town and Nelson Mandela Bay Municipality is that water restrictions can be effective. However, these are often lifted once dam levels improve and in the case of NMB, the restrictions were lifted when dams were only at 50 percent capacity (Dayimani, 2022). A more sustainable solution, in the context of municipalities in the Gauteng Province, would be setting permanent water allocation ceilings. This is because the Gauteng Province is the most populous province in South Africa and its water use is substantially above global averages (Gauteng City Region Observatory, 2019). Water allocation refers to the process of municipalities distributing water supplies to meet the various requirements of communities. These are domestic, agricultural and industrial requirements. Placing ceilings on this distribution would ensure that the municipality is able to determine how much water is withdrawn from its water sources. In addition to this, it would facilitate a more equitable distribution of water which is one of the key objectives of the National Water Act 36 of 1998.

The suggestion of setting water ceilings for each municipality in the Gauteng Province was first introduced by Rand Water through its Project 1600. The aim of Project 1600 is to “provide guidance, support, oversight of progress made by municipal sector to reduce their water demand in order for Rand Water to comply with the abstraction limit of 1600 Mm³/annum until next phase of Lesotho Highlands Scheme” (Rand Water, 2019: 1). The logic behind this suggestion was that setting an abstraction limit would ensure that municipalities would be in a position to keep consumption within the set limits and be able to monitor and evaluate ongoing usage. However, this suggestion has not been implemented by any of the province’s three metropolitan municipalities and two district municipalities (which are subdivided into six local municipalities). To ensure this implementation, the Portfolio Committee on Water and Sanitation in the parliament should introduce a bill on water allocation ceilings which must be applicable not only to municipalities in the Gauteng Province but to all municipalities across the country given the fact that water insecurity is a national challenge.

6.3.4. Strengthen and coordinate institutions for water security.

A key theme that underpins this study is that the water insecurity challenges in Hammanskraal are primarily the result of poor water governance. Through the qualitative interviews and literature review explored, there is empirical evidence to suggest that weak institutional governance and weak political leadership are at the centre of the water challenges that are facing Hammanskraal and the City of Tshwane at large. Schreiner (2013) posits that the challenge of poor water governance is not only at municipal level but also at the level of national government where factors such as the unstable political-administrative interface and the hollowing out of the then Department of Water Affairs by the exodus of technical expertise have impacted greatly on South Africa's failure to implement the National Water Act 36 of 1998. Schreiner (*ibid*) provides a reasonable critique of the glacial pace of implementation of solutions when it comes to strengthening institutional arrangements, including those which the National Water Act makes provision for. Indeed, the decision to establish an agency to manage the national water resources infrastructure was adopted over a decade ago. And yet, while the draft bill for the establishment of the National Water Resource Infrastructure Agency was gazetted on the 16th of September 2022 by the Minister of Water and Sanitation, Mr Senzo Mchunu, it is yet to be passed into law. This glacial pace of implementation is reflective of poor and ineffective water governance that extends from national government to provinces and municipalities.

There is clear evidence that one of the challenges with institutions for water security is the lack of coordination by national, provincial and local government. These tiers of government act in silos when it comes to the question of water security, with interventions often being facilitated at a point of crisis. This is the case with Hammanskraal where, for almost two decades, the local state was failing to intervene in the water challenges in the said township. According to the National Treasury (2014) provincial and local governments play critical and complimentary roles in the reduction of inequalities and elimination of poverty. Specifically, these two tiers of government “directly manage aspects of planning and regulatory systems that control land use, influence infrastructure rollout and facilitate economic activity” (*ibid*, 2014: 93). And yet, at different stages of the catastrophic deterioration of water infrastructure in Hammanskraal, the Gauteng Provincial Government failed to work with the City of Tshwane metropolitan municipality to arrest the decline and facilitate the much-needed infrastructure development. The provision of grants for this infrastructure development by the provincial government is insufficient in that there is no consequence management for failures of the local government to

implement the necessary developmental changes. This lack of synchronicity, coupled with lack of consequence management, is a stumbling block to building strong institutions for water security and needs to be interrogated. It is recommended that all three tiers of government develop a single framework for water infrastructure development that is monitored by water and sanitation departments of all three spheres, with the Ministry of Water and Sanitation as the coordinating institution. This is not an alternative to the Premier's Coordinating Forum, which aims to provide an overall structure for provincial level coordination with municipalities and other local organisations, but rather, a compliment of that. The Gauteng City Region Observatory (2019) has also suggested that in addition to this, the Provincial Disaster Management function be tasked with the coordination of water security activities.

There is also institutional review that is required in the area of water resource management. While there are Catchment Management Agencies (CMAs), these are severely constrained. At present, CMAs are defined by river basin boundaries which, in the context of the Gauteng Province, divides the province and water users between three catchments, namely the Upper Vaal, Crocodile-Marico West and Olifants (GCRO, 2019). In order to ease coordination as well as to increase the participation of water users in decision-making, it is recommended that the Vaal CMA should encompass all the areas within the province that utilise the Integrated Vaal River System. This would not only ensure better coordination, but it would provide a platform for all water users, from major commercial users to individuals and households, to participate in the development of the strategy for water security as well as in systems operations.

It is further recommended that institutions for water security are strengthened through, among other things, the implementation of recommendations from the Auditor-General of South Africa. In the consolidated report on water boards, the Auditor-General makes several suggestions on how the efficiency of the country's nine water boards can be strengthened. At the centre is fiscal prudence. The audit report for South Africa's water boards found that the majority of these boards have significant challenges when it comes to financial management as well as the monitoring of compliance with legislation (Auditor-General, 2022). The steps that need to be undertaken to implement these recommendations are comprehensively outlined in the AG's report. Given that some of the boards have been repeatedly advised on these steps, to no avail, it may be necessary to consider making consequence management compulsory in

water boards and related institutions. This would see legal action being brought against individuals and institutions that do not comply with the Auditor-General's recommendations which, by law, are binding.

6.4. SUGGESTED AREAS OF FURTHER STUDY

During the data collection process of this study, in Hammanskraal, it was observed that women in particular were the ones collecting water from distribution points. Given the spatial planning of Hammanskraal, and challenges including dysfunctional street lights, narrow roads, numerous illegal dumping sites, settlements that are not regularised and high levels of crime, this raises a concern about the safety of women tasked with collecting this water. This is especially the case in Hammanskraal and other townships which, as indicated by the most recent South African Police Service crime statistics, are bedrocks of not just violent crimes but sexual crimes including sexual assault and rape, as well as gender-based violence broadly. In fact, the crime statistics report for the fourth quarter of 2022/2023, violent crimes have increased by 4 percent while other serious crimes are also on the increase (SAPS, 2023). Significantly, more than 70 percent of the police stations reporting these increases are in township and urban areas across South Africa. For this reason, a suggested area of further study is the impact of water insecurity on the safety of women in South African townships.

In an opinion piece titled "*Water crisis could have devastating consequences for women*", penned at the time when the Nelson Mandela Bay Municipality was inching towards Day Zero and the municipal government established water distribution points, Wa Azania (2022) contends that the water insecurity crisis in NMB could set parameters for violence against women. She anchored this argument on the growing weaponisation of water in the developing world, where women pay the price of water insecurity by being sexually violated at water collection points. Studies have been conducted in countries such as Kenya where women are sexually assaulted or forced into acts of sextortion for access to water (Root, 2020). This is corroborated by the Final Baseline Survey Report of the Sex for Water Project based in Kenya, which found that girls and women in the Kibera informal settlement were forced to trade sex for water and were also more susceptible to sexual violence and sextortion while standing on queues to collect safe drinking water that is not available in their households (Sex for Work

Project, 2020). This link is explored by Tallman *et al.* (2022) whose study analyses the global overview of water insecurity and gender-based violence, concluding that:

“The most common manifestation of the relationship between water insecurity and gender-based violence was an increased risk of sexual and physical violence for women who walked long distances to access water. This was followed by intimate partner violence sparked by the inability to meet domestic obligations due to household water inadequacy.” (Tallman *et al.*, 2022: 1)

It may be worthwhile to study how, in a South Africa that is battling the scourge of both gender-based violence and water insecurity, these two challenges reinforce each other, and how this exacerbates inequalities, poverty and hunger for women. A feminist theorisation of water insecurity and violence would make allowance for a critical reflection the complex ways in which the poor governance of natural resources such as water can undermine the freedoms and human rights of women. And more than this, it can provide a critical analysis of how water has become a new frontier of war in the developing world, in the same way as food (Mahlatsi, 2023e) with women as casualties, in the same way that they are casualties of armed conflicts.

Finally, another important area of further study is the extent to which water insecurity influences social unrest in South Africa. While there have been studies on hunger and the rising cost of food as a cause of social unrest (Lebakeng, 2021; Mlaba, 2021; van der Berg and Patel, 2021; Ntengento, 2022; Sova and Zembilci, 2023), studies on the influence of water insecurity on social unrest are scant. Researcher such as Koren *et al.* (2021) argue that the effects of food and water insecurity, which are termed “staple insecurities”, should be interpreted as mutually reinforcing rather than as independent, in causing social unrest. In their study on this relationship, using Kenya as a case study, Koren *et al.* (2021) leveraged geolocated social media data across urban areas and deployed a supervised machine learning approach to separately identify geolocated tweets concerning food and water insecurity. The study found that these “staple insecurities” facilitate civilian mobilisation. It is recommended that a similar study should be done in South Africa to ascertain the extent to which water insecurity in townships like Hammanskraal, linked with food insecurity, cause or exacerbate social unrest. This would help to situate the discourse on water insecurity in the realm of popular struggles

and to illustrate the complex effects of water insecurity on social cohesion and the democratic project itself.

6.5. STUDY LIMITATIONS

In research, limitations are defined as “the constraints on generalizability, applications to practice, and/or utility of findings that are the result of the ways in which you initially chose to design the study, or the method used to establish internal and external validity or the result of unanticipated challenges that emerged during the study” (Prince and Murnan, 2004:66-67). Limitations influence the interpretation of research findings and as such, a researcher must state them to ensure credibility and illustrate how they embedded reliability in their results.

According to Whittles (2016) Hammanskraal is one of the fastest growing townships in the Gauteng Province and there are many informal settlements mushrooming across particular sections of the township. These settlements are largely established on illegally occupied land. As many of these settlements are yet to be regularised by the City of Tshwane, they do not receive social services including water and electricity, as no bulk infrastructure was laid down for their establishment. This poses a limitation on the study as in such areas, while the experiences of water insecurity can be analysed, it is the result of different factors to those informing water security in formalised parts of Hammanskraal. Furthermore, in these unregularised settlements, the efficacy of water policies cannot be sufficiently assessed.

Only ten (10) residents from Hammanskraal were interviewed for the study. Though the interviewed persons were dispersed across different sections of Hammanskraal, the sample is small in comparison to the population of the township. However, this limitation does not create a crisis of credibility for the findings of the study. This is because qualitative research is invested in deriving explanations, experiences and meanings about phenomena. This necessitates research designs which seek these out rather than explanations using numbers and statistics. It is for this reason that while the sample, at ten, may be relatively small, it does not compromise the depth and richness of the data that is required to respond to the primary and secondary questions defined in the study.

6.6. CONCLUSION

This chapter provides a conclusion to the study, providing an overview of the summary of findings linked to the research objectives that underpinned the study. It reflects on the equity dimensions and governance drivers of water insecurity in the township of Hammanskraal and the ways in which this is a function of poor governance and weak institutional arrangements. Importantly, it provides recommendations that would go a long way in alleviating the water insecurity challenges that have torn Hammanskraal asunder, causing a cholera outbreak that has claimed the lives of innocent people whose only crime was to drink contaminated water from municipal taps. The salient argument posed in this concluding chapter is that while challenges such as climate change and the geography and geomorphology of South Africa are contributing factors to its water scarcity and insecurity problems, these are amplified and reinforced by a lack of investment in critical water infrastructure. The existing water infrastructure in the Hammanskraal and the City of Tshwane metropolitan municipality is aging, having largely been built during the apartheid dispensation. And yet, despite this, there has been a glacial pace of transformation and intervention in arresting the deterioration.

This chapter reflects on four critical interventions, namely: the upgrading of the Rooiwal Wastewater Treatment Works and expansion of Temba Water Purification Plant; the setting of water allocation ceilings in Gauteng municipalities; investing in alternative water sources and tools for water conservation; and the strengthening and coordination of institutions for water security. While none of these interventions are a panacea for dealing with a challenge that has been decades in the making, and which has become worsened by climate change and related ecological challenges, they are a stepping stone towards alleviating water insecurity challenge in Hammanskraal. Furthermore, they provide an important blueprint to other municipalities that are confronted with the same challenge, particularly in the Gauteng Province where the demand for water is inversely proportional to the supply of water.

This study demonstrates that the water insecurity challenges in Hammanskraal are rooted in poor governance across all spheres of government. This poor governance is historical and cuts across the political divide. And while water availability in Hammanskraal is both

geographically and economically unequal, few residents of the township have the capacity to be resilient. Though the residents of Hammanskraal continue to find ways to resist, taking to the streets to protest for safe drinking water, and using their voting power to make water a determinant of electoral outcomes, they are disadvantaged by the clear power relations that define their relationship with a government that continues to subject them to a calamitous existence of lack of access to clean drinking water and proper sanitation. Unless the poor water governance challenges in Hammanskraal, the City of Tshwane and the Gauteng City Region are resolved, water insecurity problems will persist. This would make cholera and related outbreaks inevitable. It would be setting parameters for genocide.

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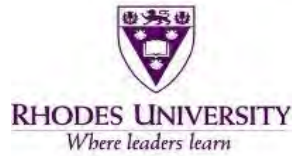
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ANNEXURE A



PARTICIPANT INFORMED CONSENT

INFORMED CONSENT DECLARATION

(Participant)

Project Title: Analysing the equity dimensions and governance drivers of water insecurity challenges in Hammanskraal, City of Tshwane, South Africa.

Malaika Lesego Samora Mahlatsi from the Institute of Water Research, Rhodes University, has requested my permission to participate in the above-mentioned research project.

The nature and the purpose of the research project and of this informed consent declaration have been explained to me in a language that I understand.

I am aware that:

1. The purpose of the research project is to analyse the equity dimensions and governance drivers of water insecurity challenges in Hammanskraal, City of Tshwane, South Africa.
2. The Rhodes University has given ethical clearance to this research project, and I have seen/ may request to see the clearance certificate.
3. By participating in this research project, I will be contributing towards deepening the understanding on equity dimensions of water insecurity in the Nelson Mandela Bay Municipality.
4. I will participate in the project by participating in a face-to-face interview to give my reflections and experiences of water insecurity in Hammanskraal.

5. My participation is entirely voluntary and should I at any stage wish to withdraw from participating further, I may do so without any negative consequences.

6. I will not be compensated for participating in the research, but my out-of-pocket expenses will be reimbursed.

7. There may be risks associated with my participation in the project. I am aware that:

a. the following risks are associated with my participation:

The distress that might arise due to the personal and painful nature of the matter being studied.

b. the following steps have been taken to prevent the risks:

The interview will take place in a safe and familiar environment. Additionally, there is guarantee of anonymity as well as confidentiality. Where such guarantee cannot be made, the researcher has explained to me that my position and associated responsibilities make the identification necessary, but that this will not result in harm on my person.

c. there is a less than 50% chance of the risk materialising.

8. The researcher intends publishing the research results in the form of a Master's dissertation. However, confidentiality and anonymity of records will be maintained where possible and that my name and identity will not be revealed to anyone who has not been involved in the conduct of the research.

9. I will not receive feedback/will receive feedback in the form of the unpublished dissertation upon completion, in written or oral format, regarding the results obtained during the study.

10. Any further questions that I might have concerning the research or my participation will be answered by:

Researcher: Malaika Lesego Samora Mahlatsi, malaikawaazania@gmail.com (066 295 7251)

Supervisor: Professor Nelson Odume, n.odume@ru.ac.za (046 603 8334)

11. By signing this informed consent declaration, I am not waiving any legal claims, rights or remedies.

12. A copy of this informed consent declaration will be given to me, and the original will be kept on record.

13. I agree/disagree (delete inapplicable) to the researcher's use of voice recording of my comments and opinions during interviews, the purpose of which is to ensure the accurate recording of my views/responses. Furthermore, I have the right to request a copy of the interview transcriptions to confirm that my opinions are accurately recorded.

I, have read the above information / confirm that the above information has been explained to me in a language that I understand and I am aware of this document's contents. I have asked all questions that I wished to ask, and these have been answered to my satisfaction. I fully understand what is expected of me during the research.

I have not been pressurised in any way and I voluntarily agree to participate in the abovementioned project.

.....
Participants signature **Witness** **Date**

Rhodes University, Research Office, Ethics
Ethics Coordinator: ethics-committee@ru.ac.za t:
+27 (0) 46 603 7727 f: +27 (0) 86 616 7707
Room 220, Main Admin Building, Drostdy Road, Grahamstown, 6139

ANNEXURE B

Institute for Water Research
Old Geology Building
Artillery Road
Rhodes University
Grahamstown
6139

Mr Lebogang Maile
Member of the Executive Committee
Department of Human Settlements and Infrastructure Development
Gauteng Provincial Government
11 Diagonal Street
Marshalltown
2107

Dear Mr Maile

RE: Request to conduct research in the City of Tshwane

My name is Malaika Lesego Samora Mahlatsi, I am reading towards a Master's degree in Water Resource Science at the Institute for Water Research (IWR), Rhodes University. I would like to request permission to conduct my study titled ***Analysing the equity dimensions and governance drivers of water insecurity challenges in Hammanskraal, City of Tshwane, South Africa***, at the City of Tshwane and broader Gauteng City Region. This project will be conducted under the supervision of Professor Nelson Odume, the Director of the Unilever Centre for Environmental Water Quality within the IWR. Upon completion of the study, I undertake to provide the Department of Human Settlements and Infrastructure Development with a bound copy of the full research report. If you require any further information, please do not hesitate to contact me on malaiawaazania@gmail.com

I have attached my research proposal to aid you in your decision and trust that my request will receive your favourable consideration.

Yours sincerely

Malaika Lesego Samora Mahlatsi (Ms)

Student number: g12m1505

ANNEXURE C



Enquiries: Emmanuel Mdawu
Tel: 082 8086 909
Email: emmanuel.mdawu@gauteng.gov.za

Ms. Malaika Mahlatsi

Email: malaikawaazania@gmail.com

Dear Ms. Mahlatsi,

Re: Analysing equity dimensions and governance drivers of water insecurity in Hammanskraal, City of Tshwane, South Africa – A Masters Research Proposal

Evidence-based decision making has been the hallmark of the democratic government since the advent of the democratic breakthrough. The subject of your research proposal could not have come at a better time. The Republic finds itself at a difficult moment in its history of the pursuit of inclusive development.

Your research work adds to the vital cog of endeavours by scholars like you and various institutions who continue to aid with planning, interventions in the provision of both economic and social infrastructure.

Tshwane, Hammanskraal presents a unique case for enquiry as part of finding long-term and sustainable solutions for providing not just water, but also, durable infrastructure to ensure security of supply.

I am therefore elated to advise that, permission is hereby given for you to conduct this important work.

It is my fervent hope that we will get to share in the wisdom of your findings as part of finding innovative solutions to our challenges.

Wishing you all the best in your endeavours.

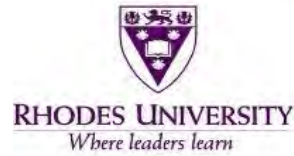
Electronically signed

Hon. Lebogang Maile, MPL

MEC: Human Settlements, Infrastructure Development and Property Management

Date: 10 February 2023

ANNEXURE D



LETTER REQUESTING PERMISSION TO INTERVIEW

Rhodes University
Drostdy Road,
Grahamstown,
6139

Professor Mashupye Maserumule
Executive Dean: Faculty of Humanities
Tshwane University of Technology
1 Abbey Matlala Road
Soshanguve
0164

Dear Professor Maserumule

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

I am a registered Master's student at the Institute of Water Research at Rhodes University. My supervisor is Professor Nelson Odume. The proposed topic of my research is **Analysing the equity dimensions and governance drivers of water insecurity challenges in Hammanskraal, City of Tshwane, South Africa**. The objectives of the study are to:

- (a) Analyse how water insecurity has manifested in Hammanskraal, City of Tshwane.
- (b) Assess the equity dimensions of water insecurity in Hammanskraal, City of Tshwane.

- (c) Explore the governance drivers contributing to water insecurity in Hammanskraal, City of Tshwane.

I am hereby seeking your consent to interview you, in your capacity as the Public Affairs professor and Executive Dean of the Faculty of Humanities about the water insecurity challenges, and specifically, the governance drivers, in Hammanskraal. I would like to propose that the interview, which will take only one hour, take place with details as follows:

Date: 22 March 2023 or 23 March 2023

Time: To be determined by yourself

Venue: To be determined by yourself

Should you require any further information, please do not hesitate to contact me or my supervisor. Our contact details are as follows:

Researcher: Malaika Lesego Samora Mahlatsi, malaikawaazania@gmail.com (066 295 7251)

Supervisor: Professor Nelson Odume, n.odume@ru.ac.za (046 603 8334)

Upon completion of the study, I undertake to provide feedback.

Your permission to conduct this study will be greatly appreciated.

Yours sincerely,

Malaika Lesego Samora Mahlatsi (Ms)

ANNEXURE E



Tshwane University
of Technology

We empower people

Rhodes University
Drostdy Road,
Grahamstown
6139

Dear Malaika Lesego, Samora Mahlatsi

Your request for interview with me for your research refers. I gladly accept your request and the proposed dates for this are workable. My personal assistant would liaise with you for further arrangements regarding our meeting.

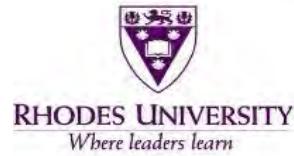
Looking forward to meeting you for the interview

Regards

A handwritten signature in black ink, consisting of several fluid, overlapping loops and a long horizontal stroke at the end.

Mashupye Maserumule (Prof)

ANNEXURE F



Rhodes University
Drostdy Road,
Grahamstown,
6139

Dr John Molepo

Executive Director: South African Association of Public Administration and Management

Tshwane University of Technology

1 Abbey Matlala Road

Soshanguve

0164

Dear Dr Molepo

REQUEST FOR INTERVIEW

I am a registered Master's student at the Institute of Water Research at Rhodes University. My supervisor is Professor Nelson Odume. The proposed topic of my research is **Analysing the equity dimensions and governance drivers of water insecurity challenges in Hammanskraal, City of Tshwane, South Africa**. The objectives of the study are to:

- (a) Analyse how water insecurity has manifested in Hammanskraal, City of Tshwane.
- (b) Assess the equity dimensions of water insecurity in Hammanskraal, City of Tshwane.
- (c) Explore the governance drivers contributing to water insecurity in Hammanskraal, City of Tshwane.

I am hereby seeking your consent to interview you, in your capacity as the Executive Director of the South African Association of Public Administration and Management, about the water insecurity challenges, and specifically, the governance drivers, in Hammanskraal. I would like to propose that the interview, which will take approximately one hour, take place with details as follows:

Date: 20 May 2023

Time: 18h00 – 19h00

Venue: Telephonic

Should you require any further information, please do not hesitate to contact me or my supervisor. Our contact details are as follows:

Researcher: Malaika Lesego Samora Mahlatsi, malaikawaazania@gmail.com (066 295 7251)

Supervisor: Professor Nelson Odume, n.odume@ru.ac.za (046 603 8334)

Upon completion of the study, I undertake to provide feedback.

Your permission to conduct this study will be greatly appreciated.

Yours sincerely,

Malaika Lesego Samora Mahlatsi (Ms)

ANNEXURE G



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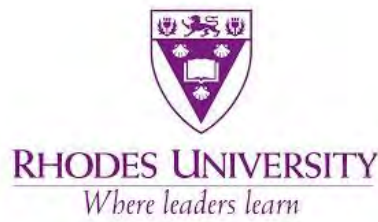
Dear Malaika Lesego Samora Mahlatsi
Rhodes University
Grahamstown
6139

This letter serves as confirmation of my availability for the interview pertaining to your Masters research study titled *Analysing the Equity Dimensions and Governance Drivers of Water Insecurity in Hammanskraal, City of Tshwane, South Africa*, scheduled for the 20th of May 2023.

Kind regards,

A rectangular box containing a handwritten signature in black ink, which appears to be 'John N. Molepo'.

Dr John N Molepo
SAAPAM Executive Director



Questions for participants

Equity dimension

1. How long have you lived in Hammanskraal?
2. What is your employment status?
3. Based on your recollection, when did water challenges in the township begin?
4. What has been the socio-economic and environmental impact of water security problems in the municipality, at a household and community level?
5. When water is rationed by the municipality, are you able to afford store-bought bottled water? If so, how much do you estimate you spend on it per week?
6. In 2022, the Department of Education decided that schools would have to be closed early due to lack of water. If you have children in school, how has this impacted their studies?
7. How has the City of Tshwane metropolitan municipality been communicating water shortages and disruptions? Do you regard the mediums used as effective?
8. In some communities within Hammanskraal, there are a lot of water leaks and burst pipes, resulting in streets being flooded. Has your community experienced similar problems in the past or currently? If so, how long did it take the municipality to repair the damaged infrastructure?

Governance drivers

9. Residents in all municipalities are required by law to participate in the development of the Integrated Development Plan (IDP) which maps out the municipality's short, medium and long-term plans for service delivery. Residents are also required to submit inputs to the municipal budget annually. This is where communities can influence how much is spent on water resources. Have you participated in this process? If so, how effective do you believe your participation was? If not, why?
10. What are the specific problems with water security in your community? Is it a question of inadequate supply, poor quality, lack of reliability of supply or a combination of two or more of these factors?
11. What do you think are the solutions to the water security crisis in Hammanskraal?

Questions for the South African Association of Public Administration and Management

1. According to the South African Association of Public Administration and Management, what informs the water insecurity challenges in Hammanskraal?
 2. Since 2004, the City of Tshwane has had at least three reports and Master Plans, adopted by Council and the Mayoral Committees, which recommended the upgrading of wastewater treatment plants in the City of Tshwane. Why have these recommendations still not been implemented?
 3. The water crisis in Hammanskraal began as far back as 2005, driven in part by the fact that the Rooiwal Wastewater Treatment Works does not have the capacity to meet the expanding population demands, which led to sewage spills. The South African Human Rights Commission (SAHRC) only looked into this case in 2019. It concluded that the City of Tshwane's failure to provide clean drinking water is a violation of human rights. What does this say about water governance in the municipality?
 4. To what extent have the recommendations of the SAHRC been implemented by the City of Tshwane?
 5. What can residents of Hammanskraal do, legislatively and otherwise, to hold the City of Tshwane accountable for the provision of clean and safe drinking water?
-

Questions for Professor Mashupye Maserumule (Tshwane University of Technology)

1. The water crisis in Hammanskraal has been present for almost two decades. To what do you attribute this challenge?
 2. As a professor of public administration, you have written about the governance drivers of the City of Tshwane's water insecurity crisis. Please outline some of these reflections.
 3. A significant number of Tshwane University of Technology students live in Hammanskraal. Having been based in Soshanguve for over 20 years, in what ways would you say the water insecurity crisis in Hammanskraal affects teaching and learning at TUT and learning institutions in general?
 4. What recourse does the community of Hammanskraal have to challenge the state on unsafe drinking water?
 5. In what ways can the community of Hammanskraal have better representation on the decision-making table of the City of Tshwane metropolitan municipality when issues of water policy and programmes are discussed?
-

Questions for the City of Tshwane's Department of Water and Sanitation

1. What does your work as the Director of Water and Sanitation in the City of Tshwane entail?
2. To what historical and contemporary factors do you attribute the ongoing water crisis in the municipality?

3. The water security challenges in the municipality started a number of years ago. What legislative mechanisms or policies have been developed to address the problem?
4. What was the process undertaken in the development of these legislative mechanisms or policies?
5. What is the efficacy of these legislative mechanisms or policies?
6. What is the state of the water and sanitation infrastructure in the City of Tshwane metropolitan municipality in general and Hammanskraal in particular?
7. What mechanisms are in place to replace the ageing Rooiwal Wastewater Treatment Plant?
8. In mid-2022, it was reported that the City of Tshwane was engaging the national Department of Water and Sanitation for financial assistance after it incurred unbudgeted costs to provide tankers to residents amid the ongoing supply challenges. How much of this financial assistance was directed at Hammanskraal specifically?
9. What is the budget for municipality's the Department of Water and Sanitation for the 2023/24 financial year?
10. What percentage of this budget is specifically for capital expenditure (Capex), and in particular, the construction of reservoirs as well as wastewater treatment facilities?
11. What is the envisioned role of the private sector and civil society, if any, in contributing to the solutions to the municipality's water challenges?

ANNEXURE I



Rhodes University Human Research Ethics Committee
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<https://www.ru.ac.za/researchgateway/ethics/>

malika mahlatsi

Email: g12M1506@campus.ru.ac.za malikazwazania@gmail.com

Review Reference: 2023-7103-7491

Dear malika mahlatsi

Title: Analysing equity dimensions and governance drivers of water insecurity challenges in Hammanskraal, City of Tshwane, South Africa

Researcher: malika mahlatsi

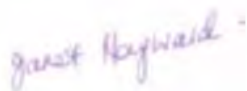
Supervisor(s): Professor Nelson Odume

This letter confirms that the above research proposal has been reviewed and **APPROVED** by the Rhodes University Human Research Ethics Committee (RU-HREC). Your Approval number is: 2023-7103-7491

Approval has been granted for 1 year. An annual progress report will be required in order to renew approval for an additional period. You will receive an email notifying you when the annual report is due.

Please ensure that the ethical standards committee is notified should any substantive change(s) be made, for whatever reason, during the research process. This includes changes in investigators. Please also ensure that a brief report is submitted to the ethics committee on the completion of the research. The purpose of this report is to indicate whether the research was conducted successfully, if any aspects could not be completed, or if any problems arose that the ethical standards committee should be aware of. If a thesis or dissertation arising from this research is submitted to the library's electronic theses and dissertations (ETD) repository, please notify the committee of the date of submission and/or any reference or cataloguing number allocated.

Sincerely,



Dr Janet Hayward

Chair: Rhodes University Human Research Ethics Committee, RU-HREC

cc: Ethics Coordinator

ANNEXURE J



To whom it may concern

This is to certify that the Senior Editor of Evera Publishing has language edited the dissertation **Analysing the equity dimensions and governance drivers of water security challenges in Hammanskraal, City of Tshwane, South Africa** by Malaika Lesego Samora Mahlatsi. This dissertation is submitted in fulfilment of the requirements for the degree Master of Science in Water Resource Science at the Institute for Water Research (IWR) at Rhodes University. The language of the document is suitable for submission, provided that the changes which have been made are maintained.

Thabiso Mahlape

A handwritten signature in black ink, appearing to read "Thabiso Mahlape", with a stylized flourish at the end.

Publisher

thabiso@blackbirdbooks.africa

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