

Exploring the nature of water crisis in Ipelegeng township, South Africa

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DEDICATION

THIS RESEARCH IS DEDICATED TO MY LATE GRANDMOTHER SELLOANE MAINE, MY PARENTS LENA AND ZACHARIA TLOU; MY SIBLINGS THABANG AND THATO TLOU; AND MY LATE COUSIN SELLOANE MAINE. THIS WORK IS DEDICATED TO ALL THE MAINE AND OLIPHANT'S FAMILIES.

DECLARATION

I, Thabo Sonnyboy Tlou; student number 26578565; declare that this full dissertation is my original work. All secondary material used have been appropriately referenced in accordance with university regulations. I declare that this full dissertation has never been submitted to this university or any other university for degree purposes.

Signature.....

Date.....

ABSTRACT

Water is fundamental for economic, environmental and social advancement. However, globally, water is becoming a scarce resource, especially for household usage. Some communities without adequate water supply have to walk long distances in search of the precious liquid, putting their health at risk of water-related diseases. Others go for days without water. In South Africa, some communities find themselves in similar situations of inadequate water supply. This study, therefore, sought to explore the nature of water crisis in Ipelegeng Township, in South Africa. This qualitative study used primary and secondary data gathering methods and the data was analysed through thematic analysis and basic survey analysis. The study revealed that the water crisis in Ipelegeng is man-made, with temporary alternative ways of supplying water to the community through water tanks proving not only ineffective but also riddled with corruption. There is therefore, need to invest in permanent water supply system, because the water sources are already there. Further study, is needed into the role of community committee in managing resources such water sources both temporary and permanent.

Keywords: service delivery, municipality, water crisis, water security, water management, service provider.

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LIST ACRONYMS

ANC	African National Congress
DWAF	Department of Water Affairs and Forestry
GWSP	Global Water Security and Sanitation Partnership
LAPSSET	Lamu-Southern Sudan-Ethiopia Transport Corridor
IDA	International Development Association
IIED	International Institute for Environment and Development
NITI	National Institution for Transforming India
PforR	Program for Results
SA Gov.	South Africa Government
SAHRC	South Africa Human Rights Commission
SDGs	Sustainable Development Goals
StatsSA,	Statistics South Africa
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNU-INWEH	Institute for Water, Environment and Health at the United Nations University
WHO	World Health Organisation
WWC	World Water Council

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CHAPTER 1

INTRODUCTION OF THE STUDY

1.0 INTRODUCTION AND BACKGROUND TO THE STUDY

Water provision has been a challenge for the Mamusa Local Municipality in the North West Province, South Africa. Some of the townships in the municipality have had no water for more than 10 years. Communities in the municipality now rely on water tanks, which at times are not filled with water. The municipality used to have hydrants to supply the local communities with water; however these have been vandalised. To cope with constant water supply disruptions, the community relies on other villages and townships. Some people resort to water sources that are not safe, triggering health scares. In fact, nearly two billion people use unsafe water sources, globally (WHO, 2007). Consequently, close to half a million deaths annually in developing countries are water related, with children under five years old most affected (WHO, 2007).

South Africa is classified as a water-stressed country, and one of the driest countries in the world (Fabrizi, 2009). The southern African country with a population of 60 million people has an average annual rainfall of 492 millimetres, compared to a world average of 985 millimetres (Schulze et al., 2007). This is despite that South Africa is located near three oceans, the South Atlantic Ocean, Indian Ocean and Southern Ocean. The country experiences uneven rainfall distribution, with the eastern half much wetter than the western half (Mckenzie et al., 2012). The southern African country also experiences alternating periods of droughts and floods. The hot dry conditions often result in high evaporation rates. Consequently, scientists have predicted that with global warming, South Africa will experience extreme weather conditions, which means increased floods and droughts (Rouault et al., 2009).

The country's water supply system is unevenly distributed, which results in water insecurity for most communities, especially in rural areas. About 67.35% of country's population lives in urban environments (StatsSA, 2021). In rural settlements where there is lack of water infrastructure, 74% of all rural people depend on groundwater (Botai et al., 2017). Water distribution systems in most cities and towns are connected to surface sources such as Limpopo and Komati rivers. However, these water supply systems have increasingly come under pressure from immigration, population growth in rural settlements and urbanisation. In rural areas, about 19% of the population do not have access to clean water supply, while 33% lack basic sanitation services (Masindi and Duncker, 2016). Besides

rural communities, more than 26% of all schools in urban or rural, and 45% of health centres, lack access to water (Muller et al., 2009).

Since 1994, when the majority government led by the African National Congress (ANC) came into power there have been efforts to reduce inequalities experienced during the apartheid era, especially among historically disadvantaged communities. Before independence there were inequalities regarding access to services such as water. Policies that determined water provision prior to 1994 were tailor-made to meet the needs and objectives of the minority whites (SAHRC, 2018). However, for the majority of blacks in rural communities, access to water services was minuscule (Glaweski, 2000). Therefore, the government in 1994, enacted pro-poor and people centered policies. In 1996, the government made water a basic human right (SAHRC, 2018), a policy copied by the United Nations and other countries. Water as a human right was meant to guarantee that everyone has sufficient, safe, acceptable, physically accessible, and affordable water for personal and domestic use (UN Water, 2014). In South Africa, for the right to water to be attained, the government prescribed a daily minimum quantity of 25 litres per person, within a walking distance of 200 metres (Department of Water Affairs and Forestry, 1994). Local municipalities and water entities were charged with the responsibility of supplying and if need be delivering water to their communities (SAHRC, 2018). However, the prescribed minimum water allocation of 25 litres a day per person remains a dream for most people, especially in rural areas and within informal settlements. Hence, effective and efficient delivery of essential services such as housing, water, and electricity to disadvantaged communities is the biggest challenges facing successive South African governments since 1994. Consequently poor delivery of basic services has often led to violent protests in both urban and rural areas.

While South Africa has large dams, water demand in other provinces is already outstripping supply and predictions are that by 2025 there will not be enough water (Department of Water and Sanitation, 2016). Signs of water stress were visible from mid-2017 to mid-2018, when the country's legislative capital, Cape Town, experienced a period of severe water crisis, with the city council introducing Level 7 water restrictions. Under the restrictions, the city council turned off the taps, and residents had to queue for water at designated points, making the legislative seat become the first renowned city globally to experience water scarcity (Booyesen et al., 2018).

However, during the water crisis in Cape Town, research revealed that the 'Mother City' had several options to boost water sources. According to Ernest Sonnenberg of City of Cape Town, available options included "Water augmentation scheme, which is transferring excess water from the Berg River Dam; an aquifer at the Table Mountain for future water users; using reclaimed water for non-potable use in local industries; investing in well-points, and the use of grey water; and potential water desalination programmes for the long-term plan is another option available" (Cape Talk, 2016).

Therefore, what emerges from the Cape Town scenario is failure to do more with the little that is available, an issue directly linked to lack of foresight within management; and unwillingness to invest in water infrastructure. What this entails is need for proactive management geared at investing in water infrastructure. In September 2019, experts warned that the Gauteng province, which houses not only the country's but continental business and financial capital, Johannesburg, could be headed for Day Zero, if South Africa experienced a drought.

Therefore, water is critical for socio-economic development; however, availability of this resource is becoming scarce. This scarcity is limiting people's access to safe drinking water and in the process creating water crises in communities. Therefore, the availability of fresh water for domestic consumption is gradually becoming a global concern. However, given the available global knowledge on water scarcity, research is needed on the actual causes in order to address the problem of access to clean drinking water. Therefore, this qualitative research sought to explore the nature of water crisis in Ipelegeng Township, in Mamusa Municipality, South Africa.

1.1 STATEMENT OF THE PROBLEM

Water problems started surfacing in Ipelegeng Township from 2013. Despite having a water source, Wentzel Dam, households in the township have dry taps in their homes. To compensate for the dry taps, the municipality introduced water rationing through water tanks. However, out of frustration with ineffective stop-gap measures, in 2017 residents from Ipelegeng's Slovo and Makhala sections burnt some of the water tanks. Since then, violent protests over water are frequent in the area. While the 2017 protest resulted in people walking long distances to fetch water, the community felt their actions sent a signal that water tanks are not solving their problem. Residents want a long-term water solution.

In the midst of the water crisis, community leaders claim that the area has sufficient underground water which the council is failing to investigate and invest in. However, whenever there is water through the tinkering system, residents in Ipelegeng are allocated less than the constitutionally stipulated amount of 25 litres per person. Instead in most cases a household has to share 25 litres meant for one person. What is ironic is that for almost four years, 2009-2012 there was uninterrupted water supply to households. However, when the service providers were changed, the water problem surfaced.

Water sustains life, brings economic growth; and social and environmental development (The Water Wheel, 2009; Machete, 2011). However, challenges in providing water especially to communities is no longer a localised, phenomenon but a global problem that affects every sphere of life – from individuals, industries to economies. Though globally water is plentiful, freshwater is however limited. “The global demand for freshwater is growing rapidly due to population growth, rapid industrialisation, urbanisation and greater affluence,” (Aime et al., 2022: 7575). This comes at a time when climate change and environmental degradation are shifting regional and seasonal rainfall patterns (Shah, 2012). Goal 6, of the Sustainable Development Goals “universal access to safe and affordable drinking water by 2030”, requires investment in adequate infrastructure, provision of sanitation facilities and encouraging hygiene at every level (Shah, 2012). The United Nations argues that improving sanitation and access to drinking water, requires increased investment in the management of freshwater ecosystems and sanitation facilities in several developing countries (United Nations, 2015). Therefore, effective management of water is critical for effective and efficient supply to households.

1.2 RESEARCH OBJECTIVES

The main objective of this study is to explore the nature of the water crisis in Ipelegeng Township.

The sub-objectives are to:

- Investigate possible causes of water crisis in Ipelegeng Township.
- Explore the role of stakeholders in the water crisis in Ipelegeng Township.
- Examine possible solutions to the water crisis in Ipelegeng Township.

1.2.1 Research Questions

The main question is – What is the nature of the water crisis in Ipelegeng Township?

The sub-questions are:

- What are the possible causes of water crisis in Ipelegeng Township?
- What are the roles of different stakeholders in the current water crisis in Ipelegeng?
- What are the possible solutions to water crisis in Ipelegeng Township?

1.3 SIGNIFICANCE OF THE STUDY

Many studies that try to address water delivery problems have been done in South Africa and outside the country. For example, Elliot Masoto Machete, conducted a research addressing the causes and impact of water shortage in the households of Ga-Kgapane Township, Limpopo Province. The findings revealed that some households started experiencing water shortages for almost ten years, 2000 - 2010. The findings revealed quite a number of possible causes of water problems such as population growth, unfair distribution of water to various sections of the township (Machete, 2011). The study further revealed that the local municipality hardly communicates to households about water problems.

Another study by Wanjohi Perpetua Ngima about the impact of water shortage in Githarai Ward, Kiambu County, Kenya, revealed that there was inadequate water supply in the area as a result of poor management, population explosion caused by the rural-urban migration, dilapidation of water source points and poor maintenance of the water system (Ngima, 2015). Therefore, this study is significant because there is no literature on the nature of water crisis in the rural community of Ipelegeng Township. The study will therefore, not only contribute to literature on water crisis, but also provide the local authorities with new ways of tackling water scarcity.

For the local community the study will help enlighten them on their role in water management. Most communities believe that service delivery issues are sole responsibility of the government or other assisting agencies. Detaching themselves from the management of resources such as water exposes the community to mismanagement that results in shortages, unequal distribution or crisis. Therefore the study will improve and strengthen participation of the Ipelegeng community in water management. Community based approaches to water management are an effective way to achieve sustainability (Wynne et al., 2018).

1.4 THEORETICAL FRAMEWORK

The study is premised on the social capital theory. This theory that emerged in the late 1970s is a multidimensional phenomenon that looks at different social institutions that foster cooperation and collective actions for mutual benefits and contributes to economic and social development (Moore and Carpiano, 2020). The theory is used to explore “choices of individuals with regard to their cooperative behaviour towards common-pool resource management in light of social norms, the cooperative or opportunistic behaviours of others, perceived costs and benefits of alternatives, monitoring, and sanctions imposed for non-performance” (Margaret et al., 2017). Social capital is more about the importance of relationships in assisting communities to transform their economic and social abilities for the good of the community.

Social capital is critical to development, particularly in the rural areas, where there is need of cooperative behavior in the governance of water sources (Bisung et al., 2014; Motiram, and Osberg, 2010). The governance of community based water sources, requires members of that locality to work together to achieve a common goal. Therefore, the success of community-based approaches is influenced by the social capital in that community (Bisung and Elliott, 2014). The social capital theory puts emphasis on the significance of different networks coming together for the development of the community (Moore and Carpiano, 2020).

The success mentioned above emanates from the ability of the community to form a committee that manages; monitors and maintains the community's water points. Bisung et al., (2014) therefore, contends that the organisational behavior of a community is determined by its social capital. Lack of trust in the committee by water users; poor communication with and support from implementing organisations; or poor support from the community have a bearing on the sustainability of the local water system (Bisung et al., 2014; Motiram, and Osberg, 2010; Foster 2013). The anticipation is that vibrant social capital should produce strong community governance of local water systems, leading to sustainable management of water resources. Therefore, the social capital theory provides a framework to explore relationships in a community and their impact on governance of water points.

In this study, the social capital theory helped explore the importance of community involvement in the provision and maintenance of service delivery, such as clean water. Therefore, social capital

conveyed significant benefits to poor and marginalised communities, such as Ipelegeng Township. In this study, the social capital theory helped understand the roles of various stakeholders in the water crisis, especially the community who are the water users. The theory also helped explain the relationships that exist within the community; and the relationship between the community, municipal officials and/or with service providers.

The study also weaved in the theory of social access, which looks at factors that influence and/or impacts on access to basic services by the intended users. Some of the factors that may limit social access to services are high cost of goods or services, lack of requisite infrastructure or prejudices within the society that limits use (Parlee et al., 2021). Lack of basic services in the community, may be due to the high demand and lack of maintenance in the municipality or the district. Social access is dependent on the amount of power that an individual holds within the community. Therefore, the power that one wields ensures that one gains, controls and maintains access to resources (Parlee et al., 2021). This means that different people and institutions possess different bundles of powers through various formal and informal processes. However, the power strands shift and change over time, thus changing the nature of power and forms of access to resources (Treue and Nathan, 2007).

Social access has become preferred approach in community based natural resource management (Treue and Nathan, 2007). The theory is premised on the notion that communities through indigenous knowledge systems are best placed to manage local natural resources in a way that is beneficial to both the community and the environment. Ideally the approach is meant to reduce poverty through active participation of members of the community and conserve the natural resources at stake (Treue and Nathan, 2007).

The importance of social access is to make the community aware of their rights, and how important these are when it comes to the services that must be provided to them, especially from the government, at national to local level. Social access helps explore the significance of community involvement in the provision and maintenance of natural resources, such as clean water (Parlee et al., 2021).

Therefore, social capital and social access allow local leaders and other stakeholders to work together in allocating services and facilities more effectively within their communities (Parlee et al., 2021; Treue and Nathan, 2007). Ideally, social capital and social access should create opportunities where community members, groups and councils are able to exchange information and views that might lead to policy possibilities.

1.5 DEFINITION OF KEY CONCEPTS

1.5.1 Water Supply

According to the Department of Water Affairs (2010) “water supply is the provision of water by public utilities, commercial organisations, community endeavours or individuals, usually using a system of pumps and pipes in a community.” Therefore, in the context of this study, water supply refers to access to clean water by the community of Ipelegeng Township.

1.5.2 Water crisis

World Vision (2018) defines water crisis as a water deficiency or a lack of safe water supplies. As the population of the world grows and the environment becomes further affected by climate change, access to fresh drinking water is dwindling. Water crisis usually arise through bad management of water sources and lack of investment in water infrastructure (World Water Council, 2021). In this research, water crisis is when a community lacks access to water for domestic use including sanitation in prescribed amounts for several days.

1.5.3 Water security

According to UN Water (2013)

Water security is 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. Water security also entails access to safe and sufficient drinking water at an affordable cost in order to meet basic needs, which includes sanitation and hygiene and the safeguarding of health and well-being.

1.5.4 Water shortage

Water shortage is a condition where distribution of water sources are inadequate for a community, mainly because of climate change, population increase or other factors that may additionally lead to a shortage of water for consumption (UN Water, 2014). According to Department of Water and Sanitation (2016) water shortage, is broadly lack of access to adequate quantities of water for human and environmental uses. Water shortage is now increasingly being recognised in many countries as a serious and growing problem.

1.5.5 Development

Singh (2009) defines development as a broad idea that encompasses socio-economic and political spheres of life. One can conclude that, according to this definition, development focuses on three components of life, which are social, political and monetary aspects. Development is normally pegged against North America and Western Europe standards which tend to distort development.

1.5.6 Underdevelopment

According to Chew and Lauderdale (2010) underdeveloped economies are those economies that experience low to poor economic growth; with most institutions such as health in total collapse. The countries also experience high death rates and high birth rates and are dependent on international financial institutions. Underdevelopment is a term that symbolises poverty of international locations, which has been changing over time.

1.5.7 Service Delivery

Service delivery is the distribution of basic services that citizens depend on such as water, electricity, sanitation amenities, waste removal, health services, roads and drainage systems. These services are provided by the local authority or by an organisation on behalf of the local government agency (Alford and O'flynn, 2012).

1.5.8 Service Provider

A service provider refers to third party or outsourced suppliers of services that have a direct and immediate effect on the quality of lives of people in a community that requires those services (Alford and O'flynn, 2012). At local government level, some of the important services that could be outsourced by a council include water supply; sewage collection and disposal; refuse removal; electricity and gas supply, municipal health services, municipal roads and storm water drainage;

street lighting; and municipal parks and recreation. In most cases service providers are hired because they are better resourced with the capacity both personnel and financial to administer the required services. Therefore, a service provider is an organisation or company hired to directly provide a service.

1.5.9 Municipality

Municipality is the lowest form of government that is close to the people. Therefore, many basic services are best delivered by this form of government, where the local ward councillors are the closest politicians to communities (Robson, 2021). Local government has characteristics and features of a national government, yet manages issues of populace inside a certain domain or area (Robson, 2021; Stone, 2009).

1.6 SUMMARY

The chapter provided an overview of the study and what necessitated the research. The chapter provided the introduction and background to the study; detailed the problem statement of the study; the research objectives and questions; the significance of the study and the theoretical framework used to anchor the investigation. The next Chapter Exploring Global Water Crisis looks at literature around water crises in different communities and how such challenges have been addressed.

1.7 STRUCTURE OF THE DISSERTATION

Chapter 1: Introduction to the study: provides an introduction, background to the study; problem statement; research objectives and questions; significance of the study; and the theoretical framework.

Chapter 2: Exploring global water crisis: literature review of water crisis around the world; and through case studies looks at how some countries have addressed their water challenges. The chapter also looks at the South African water supply context and various legislation promulgated to promote access to clean and safe water.

Chapter 3: Research Methodology: details how the study was conducted – the data collection methods and challenges faced during the field work.

Chapter 4: Research Findings: explains how the data was analysed and discusses the outcome of the research – what the interviewees said about water issues in Ipelegeng Township.

Chapter 5: Exploring the nature of water crisis in Ipelegeng Township: the chapter provides an in-depth discussion of the results of the study in context to the research objectives; literature review; and theoretical framework.

Chapter 6: Conclusion and Recommendations: the chapter rounds up the study and provides recommendations on how to deal with the water crisis in Ipelegeng Township.

CHAPTER 2

EXPLORING GLOBAL WATER CRISIS

2.0 INTRODUCTION

This research explored the nature of water crisis in Ipelegeng Township, in Mamusa Municipality, South Africa. Already in section 1.0 of Chapter 1, mention has been made that South Africa is generally regarded as dry country which contributes to poor water provision in most parts of the country. However, challenges of water provision are not only peculiar to South Africa, but are a global concern. Therefore, this chapter will explore the global water crises through four cases studies from four different countries. The case studies serve to provide different contexts of the kind of challenges that these countries face in water provision and their solutions. Though addressing water crisis differs and the solutions not prescriptive from one area to another, lessons could be drawn from the processes undertaken leading to the solutions. Therefore, the chapter is divided into two sections; the first section explores global water crises through different study cases. The second section looks at South Africa's water provision; the relevant laws; success and challenges in supplying water to communities. The study's research objectives were key in reviewing different literature regarding global water crises.

2.1 GLOBAL WATER CHALLENGES

Water is critical for sustainable development, which is measured through economic, environmental and social advancement (WHO, 2019). However, predictions are that without concerted investments in water infrastructure and management, the world will not only miss the water-related Sustainable Development Goals (SDGs), but 40% of the world's population would live in seriously stressed water areas by 2035 (Guppy and Anderson, 2017).

According to Aime et al., (2018: 7512) "There are two types of water bodies, namely: surface and underground. Surface water includes oceans, seas, rivers, streams, brooks, lakes and flood, while underground water comprises boreholes and wells." Seventy percent of the earth's surface is covered with water about 97% of that water is salty, with the remaining 3% being fresh water (Department of Water and Sanitation, 2016). Of this amount of freshwater, less than 1% is available for life on earth, whilst the rest is in the form of ice at the poles. Despite abundant surface water, the majority of people worldwide drink untreated underground water, mainly out of ignorance, and in some cases due to lack of access to basic methods of water treatment before usage (Aime et al.,

2018). Therefore, the availability of fresh water for domestic consumption is gradually becoming a global concern.

There are two types of water scarcity that often result in water crisis: physical or economic water scarcity (Water.org, 2022). According to World Vision (2019) physical water scarcity is when there is not enough water to meet demands of consumers, including for ecosystems to function effectively. Economic water scarcity results from lack of investment in infrastructure and/or technology to draw water from different water sources, or from lack of human capacity to satisfy the demand for water (Aime et al., 2018). Economic water scarcity is prevalent in much of Sub-Saharan Africa; and is the reason why more than 700 million people lack access to safe and clean drinking water.

Access to water refers to the ability of a person to get clean water within a reasonable distance, if it is not available in the home. The prescribed amount of clean water for each individual is pegged at between 20 – 40 litres per day (UN Water, 2014). However, about two billion people in the world lack access to the prescribed amount of water (WHO, 2019). According to the World Water Council (WWC) the water crises being experienced in communities is a result of bad management of the resource (WWC, 2021). Lack of access to safe drinking water exposes people to health crisis. Some communities without adequate water supply have to walk long distances in search of the precious liquid, often from unprotected water sources resulting in water-borne diseases. Most of the people who draw water from unprotected sources are in sub-Saharan Africa, widening existing gaps between the rich and the poor (WHO, 2010). Nearly one million people die each year from water, sanitation and hygiene-related diseases, which could be reduced with access to safe water or sanitation (Water.org, 2022). Consequently, one of the greatest causes of poverty in Africa that is overlooked is lack of access to clean drinking water (Liu et al., 2019).

Water scarcity locks women in a cycle of poverty. Women are most affected by the water crisis, they search and fetch water often from unprotected sources; as a result other household chores and economic activities are neglected, while the girl-child is forced to miss school helping look for water. Globally, women and girls spend 200 million hours a day in search of water for domestic use (World Vision, 2019). In monetary terms more than \$260 billion is lost each year in time spent searching and gathering water or seeking safe sanitation (Water.org, 2022); money that could be invested in water related infrastructure. Therefore, investing in water infrastructure is one way of empowering women;

because when women have access to safe water at home, they can pursue more economic activities beyond water collection and their traditional roles (Water.org, 2020).

While attempts have been made to provide water to about three billion people between 1990 and 2015, there are still 850 million people in the world who do not have access to clean water (World Vision, 2018). Without access to clean water, people continue to be trapped in the poverty circle. This state of life forces children mostly girls to drop out of school, while parents struggle to make a living (World Vision, 2018).

The World Health Organisation argues that most of the global water problems are caused by management problems (WHO, 2019). Therefore, the global health body contends that improving water supply and sanitation and improved management of water resources could grow economies and in the process reduce poverty. However, with urbanisation and changes in lifestyle, consumption of water is increasing, putting pressure on existing water infrastructure. The result is water shortage, which is both a cause and consequent of poverty (Liu et al., 2019). Population explosion especially in urban areas, increases water demand for domestic, agricultural and industrial usage. Therefore, only proper planning and investment would ensure that no human activity is denied water. “Improper planning and management can mean that an activity will be unregulated, and can lead to a range of negative social, economic and environmental impacts” (Tucker et al., 2014: 28). Water crisis is more experienced in developing countries, largely because of poverty, costs of infrastructure, and poor governance. These factors are also compounded by the effects of climate change on the water cycle.

About US\$23 billion per year is needed to achieve the international development target of reducing by half the percentage of people who lack access to improved water sources globally, which is pegged at 18%; and better sanitation services, which stands at 40% (WHO, 2019). National governments currently use about US\$16 billion a year in constructing new infrastructure. The supplementary US\$7 billion per annum required to supply water and sanitation to communities in need, is less than one tenth of what Europe and the United States spend on luxury drinks such as alcoholic beverages and ice creams (United Nations, 2015).

2.2. CASE STUDIES

2.2.1 Biased water policy in China

Despite more than 30 years of rapid economic growth in China, close to 110 million rural Chinese people still lack access to safe drinking water (Lin, 2014). China's water allocation policy seems to favour urban areas, as it prioritises industrial development to boost the national economy (Liu et al., 2019). "The construction and management of urban water resources is relatively perfect, but the construction and management of rural water resources is seriously lagging behind, and cannot even meet the reasonable needs of rural residents," (Wang et al., 2009). The bias against rural communities in the water policy has seen the regions lagging behind in construction and management of rural water resources, resulting in failure to meet water needs of rural residents, and in the process affecting development of rural communities (Liu et al., 2019). Director of the Beijing Health Association Professional Committee for Drinking Water, Zhao Feihong, said "Remote rural areas tend not to have tap water supplies and the water people use is not properly processed. Agricultural chemicals, faeces and other pollutants can easily enter their drinking water," (Lin, 2014: 14). Therefore, inadequate water supply in rural areas has become a bottleneck, and has restricted rural development and the improvement of rural social productivity (Liu et al., 2019).

Out of China's 661 cities, about two thirds of them are in short supply of water, with close to 110 cities experiencing severe water shortage because of increase in urban population and growing urban industries (Liu et al., 2019). Shandong, one of the leading economies in China, has been facing water crisis caused by rapid urbanisation (Wu and Tan, 2012). The province gained prominence from China's economic reform and opening-up policy. However, the resultant social and economic development failed to match water needs for domestic activities and industrial production. According to Wu and Tan, (2012), because of excessive exploitation, most of the rivers flowing through cities or towns in Shandong province are severely polluted. The pollution is mainly caused by wastewater discharged from industrial and urban residential areas (Wu and Tan, 2012).

Villagers in Zizhu have had to change multiple water sources because of mining and fishing activities that always polluted their water (Hao, 2014). As a result most of the villagers dug their own wells, typically around 12 meters deep. But coal mining altered underground water table, forcing the villagers to increase the depth of the wells to 70 or 80 meters (Hao, 2014). At one stage a private water supplier installed piped water from a nearby reservoir, to the village. However, for the same reservoir the private water supplier had also signed a 15-year contract with a fish farmer. As a result,

fishing polluted the water to the extent that villagers could not even use it for domestic purposes (Hao, 2014).

While villagers in China's rural areas are aware of their water problems, solutions have been temporary; and because of their low incomes and lack of water infrastructure, the villagers have had few choices (Hao, 2014). A few villages buy bottled water, some have installed water purifiers, or transport water from cleaner sources nearby.

The increasing water crisis in China's urban and rural communities presents an urgent problem for sustainable development. There is need to invest in water infrastructure and also realign allocation policies that favours both urban and rural areas.

2.2.1.1 Developing inter-city water resource networks in China

To address some of the water problems, China has embarked on inter-city water resource network. The strategy entails transferring water from well resourced areas to needy ones (Wu and Tan, 2012). Wang et al., (2009) reckons that establishing advanced intercity water networks would help reallocate water resources where they are needed most, This would mitigate against insufficient and unevenly distribution of water. Therefore, development of urban water systems should result in improved rural water systems, while development of rural water system should provide support for the development of the urban water resource system, forming mutual promotion between urban and rural water systems (Liu et al., 2019), thereby, creating a symbiosis mechanism of urban and rural water systems. In addition, water scarce provinces such as Shandong, purify and recycle waste water (Wu and Tan, 2012).

2.2.2 Water crisis in India

According to the National Institution for Transforming India, (NITI Aayog), India with the second largest population in the world is facing its worst water crisis in history (NITI Aayog, 2019). About 600 million people from India's population of 1.4 billion do not have access to clean drinking water. Consequently more than 20% of the country's diseases are water-related (Snyder, 2022). This is despite improvements done over the past decades to improve quality and access to municipal drinking water systems. Like in most developing countries, water in India is a source of inequality. The water crisis in India is often blamed on poor planning and corruption on the part of government; increased corporate privatisation; and industrial and human waste (Snyder, 2022). In almost every Indian city the majority of the people are not connected to piped water systems. Most of those who have tap water, share with their neighbours (Koner and Samanta, 2021). One of the major problems

with the water systems in Indian cities is obsolete infrastructure, which is failing to cope with the increasing demand (Snyder, 2022). While the country is generally dry, some India cities and towns are wetter, because of seasonal floods. However, most of the water in India goes to agriculture, which results in water pollution.

One of the Indian cities facing water crisis is Darjeeling, which has no access to ground water. The city's drinking water problems escalates in summer. The water crisis in the city is mostly attributed to the old water infrastructure which is failing to meet the increasing demand, and in the process creating unequal access among the different user groups within communities (Koner and Samanta, 2021). The current water supply infrastructure in the city was constructed for a limited number of people during the British colonial rule (Koner and Samanta, 2021). Therefore, with the expansion of the city and population growth, the infrastructure is no longer adequate to sufficiently cover the entire city (Snyder, 2022). Moreover, the municipal water network does not cover the peripheral areas, as the cost of laying water-pipes increases with distance (Koner and Samanta, 2021). Therefore, distance from the core becomes a barrier for out laying areas, which are mostly poor to access water.

Increasing scarcity has paved the way for illegal tapping, with flow of water following money and power (Koner and Samanta, 2021). The supply system is riddled with illegal connections, and the people involved in the system misuse political power (Koner and Samanta, 2021). The extent of water crisis in Darjeelingcity, often result in some communities only getting water after every five to seven days during the rainy season. During the dry season when many taps and tanks are dry, water is only supplied after 10–15 days. However, on days when municipal water supply is available, it is only for an hour fifteen minutes a day mostly in the morning (Koner and Samanta, 2021). As a result some people resort to illegal tapping of the water system, which affects the flow. Radonic and Kelly-Richards (2015) believe that such illegal connections and supply are as a result of asymmetrical distribution and use of power. Consequently, illegal water connections highlight the failure in water governance. The water situation is worsened by big institutions such as hotels in the city, who bribe the valve-men, who are in charge of turning the taps on and off. The valve-men also provide these businesses with extra water (Koner and Samanta, 2021).

Koner and Samanta's research on water crisis in Darjeeling city concluded that the problem was not natural but man-made by a group of people with vested interests. "The city's water supply system is the best example of water-political/economic power nexus; where public supply of water is controlled by some socio-political factors, such as financial condition, social status, and political influence of the households," (Koner and Samanta, 2021). Illegal connections that have been left unabated have

resulted in private water business that has turned the water into a commodity for sale. Consequently, this commoditisation of water adversely affects the marginal groups (Koner and Samanta, 2021).

2.2.2.1 Streamlining water management in India

The Indian government has committed to provide safe tap drinking water to every rural household by 2024. However, Abraham (2022) argues that for the Indian government to meet the 2024 deadline there would be need to mobilise efforts of civil society, the private sector, and the public at large. Adding, that what need to be addressed is the reversal of the shrinking stock of potable water to supply these rural homes (Abraham, 2022). The government also has to streamline the multiplicity of the departments that govern water and allied issues at the micro level, which presents a huge hurdle to a composite view and sustainable solutions (Koner and Samanta, 2021). There is need to stop treating water as a commodity but as a resource and start huge investments in water harvesting to build and protect water availability and to harvest a reasonable part of the monsoon flows (Abraham, 2022). Suggestions have also been made to create awareness around water through a national literacy mission with the media playing a critical role in reiterating the message (Abraham, 2022; Koner and Samanta, 2021).

The government therefore, needs to reduce the inequity and increase access to water for all, irrespective of class, caste, gender, and other sorts of disadvantageous conditions (Kumar 2014; Koner and Samanta, 2021). To do this successfully, there is need for a strong institutional setup, which includes abundance of skilled and unskilled staff, abundant funds, timely implementation of development plans, effective cost management, and most importantly fair regulations of the system are prerequisites (Kumar 2014; Koner and Samanta, 2021). Authorities also need to renovate the existing lakes and focus on increasing storage capacity through new lakes and tanks considering the increasing demand (Koner and Samanta, 2021). To ensure water sustainability in Darjeeling city, (Koner and Samanta, 2021; Kumar, 2014) propose a public-private partnership strategy to revive the springs, which includes effective community participation in managing and protecting the springs in and around the city, as the users have more indigenous knowledge about and attachments with the local environment.

2.2.3 Water Crisis in Africa

Sub-Saharan Africa has plenty of rainwater, which is seasonal and unevenly distributed. In recent years, these seasonal rains have resulted in frequent floods and droughts (Naik, 2016). As alluded to in section 2.0, lack of access to clean water is one of the causes of poverty in Africa; not only water to drink, but for food security, because most of the continent's agriculture is rain-fed. Therefore, there is

a close nexus between lack of water and poverty in Africa. Most diseases in Africa that kill millions every year are water-related. Exposure to contaminated water often results in diarrhoea, typhoid and cholera (Oluwasanya et al., 2022). Lack of water forces children to miss school either in search of the resource or because there is no food, depriving them of education, a key tool to escaping poverty.

According to Naik (2016) physical water scarcity is apparently nonexistent in most African countries. The continent has enough surface as well as groundwater resources. Seventy-five percent of water supply in Africa is groundwater (UNESCO, 2012). “Fifteen percent of the world’s population living in Africa share about 10% of its water resources, which is not at all an unhealthy scenario as portrayed by many” (Oluwasanya et al., 2022). But the concern is about Africa’s rapid population growth, which is likely to double by 2050 (Naik, 2016). The population explosion and accompanying human activities and climate change pose a threat to groundwater resources. Therefore, water crisis in Africa is of an economic nature.

Access to adequate drinking water in Sub-Saharan Africa often gets distorted in the supply and demand relationships. “Some attempts have succeeded in addressing water adequacy in terms of both the quantity available and that demanded; however, most attempts have failed to address other components of water adequacy such as distance and price”, (Gedo and Morshed 2013). According to UNESCO (2012), the situation is compounded by the fact that almost all African countries do not possess adequate human, economic and institutional capacities to effectively develop and manage their water resources sustainably. Consequently, 13 countries were said to be facing water stress or scarcity in 2019; and the number is expected to rise to 18 countries by 2025, translating to 600 million people who would be water-stressed (World Vision, 2019). Only 13 of the 54 countries in Africa have some semblance of water security, with Egypt, Botswana, Gabon, Mauritius and Tunisia being some of the most water-secure countries on the continent. While Chad, Niger and Somalia are considered the least water-secure countries in Africa (Oluwasanya et al., 2022).

Rapid population growth, expanding urbanisation, and increased economic development have all strained existing water infrastructure in most African countries, limiting access for households. As a result, households in urban slums, informal settlements and rural areas resort to unprotected water sources.

2.2.3.1 Water crisis in Kenya

From a population of 53 million, 15 percent of Kenyans rely on unprotected water sources, such as ponds, shallow wells and rivers, while 41 percent lack access to basic sanitation (Maingey et al.,

2022). These water and sanitation challenges are more visible in Kenya's rural areas and urban slums, where many are not connected to the piped water system (Maingey et al., 2022). This is despite that water is a human right, according to Article 33d of the Constitution of Kenya 2010, (Rodrigues et al., 2015). However, in the current state of water supply, the low-income group's right to quality water is the most infringed (Rodrigues et al., 2015). Water supply is generally characterised by low levels of access, especially in urban slums and rural areas, as well as poor quality in the form of intermittent water supply (Marshall, 2011; Nyanchaga, and Ombongi, 2007). Out of 55 water service providers in Kenya, only nine were said to be able to provide continuous water supply, which is dependent on seasons and regions (Kandji, 2006). While a few Kenyan water utilities provide water for 14 hours per day, only seven areas in the whole country have continuous supply of water (Kandji, 2006). Kenyan capital city, Nairobi, has an average of 16 hours a day of water supply while the port city of Mombasa has six hours of water supply every day. In Kisumu, over 40% of households both poor and non-poor who are connected to water mains experience low water supply (Nyanchaga and Ombongi, 2007). Those without access to piped water rely on polluted water sources, which causes cholera epidemics, diarrhoea, and typhoid that affect health and livelihoods (Marshall, 2011). The economic water burden on communities reflects the government's lack of investment in water infrastructure, especially in rural areas (Nyanchaga, and Ombongi, 2007). This lack of investment in water is exemplified by the Kakamega Provincial District General Hospital which lacks sufficient supply of clean water. The health institute collects water in buckets for patients (Marshall, 2011).

Most slums in Nairobi have wells near toilets; hence most cholera outbreaks in Kenya are linked to areas where residents have dug wells near latrines, resulting in sewage seeping into the water (Marshall, 2011).

2.2.3.1.1 Private sector shun Kenya's water sector

Poor management of water supply is broadly responsible for water crisis in Kenya (Marshall, 2011). A 2006 government report on water resources blamed unsustainable water policies, weak water allocation practices for most of the country's water problems (Karanja, 2011). This mismanagement of water affairs is also responsible for non-participation of the private sector; this is in contrast to Benin, where the private sector has partnered with the government to improve access to water in both rural and urban settings (Aime et al., 2018; Comair et al., 2022). Poor planning in water distribution has forced many Kenyans to rely on wells, often dug near pit latrines, which results in contaminated water (Marshall, 2011), resulting in water borne diseases that are prevalent in urban slums. Funding for water infrastructure has failed to match the increasing population. Frequent drought periods have depleted the country's water bodies, with deforestation helping prolong the

drought episodes. The government also has to deal with population explosion, especially in urban areas that is over-stretching water and sanitation infrastructure. The population is rising while the water catchment area is declining (Marshall, 2011; Nyanchaga, and Ombongi, 2007; Kandji, 2006; Karanja, 2011). Therefore, issues of mismanagement, lack of maintenance of infrastructure and disinterest in investing in water infrastructure makes the water crisis in Kenya man-made.

2.2.3.1.2 Addressing water infrastructure deficit in Kenya

To address water problems in Kenya, the government constructed two multi-purpose dams, with a storage capacity of 2.4 billion cubic meters along the Nzoia and Nyando rivers. Another 24 medium-sized multi-purpose dams, with a total capacity of 2 billion cubic meters, have been planned to supply water for domestic, livestock and irrigation use in the arid and semi-arid lands areas of Kenya (Marshall, 2011). At national level, the government plans to expand the Mzima water pipeline, to feed the demands of the coastal towns and cover urban water supply and sanitation in the satellite towns around Nairobi, Mombasa, Kisumu, Nakuru and Kisii, together with 26 medium-size towns that have the capability to support manufacturing and tourism activities (Marshall 2011). Non-governmental organisations have designed an approach that covers community sensitisation, training personnel and community involvement in water quality at the point of use (Rodrigues et al., 2015). The programme is aimed at controlling the prevalence of waterborne diseases; improve the quality of life and opportunities for the communities; and sensitise individuals of their water rights as provided for in the Kenya Constitution 2010 (Rodrigues et al., 2015). A desalination plant is also part of the government plans for tourism attraction areas such Lamu (Maingey et al., 2022).

2.2.4 Equalising access to water in Benin

Benin with a population of about 11 million people has had problems of adequately providing water to her citizens. The administration of the country is divided into 12 departments, 77 municipalities, 568 districts and 3378 villages and cities (Fousseni, 2009). About 61% of the country's population live in rural areas. Despite Benin's potentials with 13 billion cubic meters of water per year and 2 billion cubic meters per year of surface water and groundwater respectively, the West African country has challenges in supplying good-quality drinking water (Assogba and Dain, 2017). In Benin, a six-month dry season affects the water supplies (Assogba and Dain, 2017; Fousseni, 2009). Like in most countries, Benin faces disparities in water provision between rural and urban areas. Lack of drinking water in the rural area presented numerous challenges, with children suffering from waterborne diseases. According to Aime et al., (2018), the biggest problem facing Benin is water pollution, with the main sources of pollution being untreated sewage, and runoff water from industries, and farms. Consequently, the majority of the diseases in Benin are water related. These water-borne diseases

contribute to high infant mortality, which was estimated at 59 per 1,000 live births in 2019 (Comair et al., 2022).

The country's water challenges forced communities in areas such as Galata to walk long distances in search of water, just to avoid long queues at existing water pumps (Fousseni, 2009). Galata with a population of 2, 417 people had two functional water pumps, which always caused chaos as people wait in long queues for water (Fousseni, 2009). The same situation was also experienced in Agbon village, with 3, 515 people. The village had three water pumps, which meant one pump per 1172 people (Fousseni, 2009). "The inability of the two villages to obtain adequate supplies of drinking water accounts for the high prevalence of diseases related to the fecal contamination of water such as cholera, parasitosis and gastroenteritis," (Aime et al., 2018). Consequently, in these areas, girls were forced to drop out of school to trek kilometres every day to fill a 25 litre can of water. Most of the water was fetched from backwater and rivers (Fousseni, 2009). Where water was available, there were high chances that it was contaminated (Assogba and Dain, 2017). Hence, clean and safe water supply in rural areas became a government priority.

Even in urban areas, drinking water is rare in the dry season. This is the case in Glazoué, where taps could go for months without a water trickle (Aime et al., 2018). Residents have to resort to the water sources of neighbouring villages.

One of the challenges with regard to water provision in Benin is distance to water points, which contributes to uneven supply and distribution of water (Aime et al., 2018). This is largely attributed to poor planning on the part of government, hence their attempts to engage the private sector and international development community (Fousseni, 2009). The poor planning is highlighted by the fact that girls drop out of school to trek kilometres every day to fetch water (Assogba and Dain, 2017). When the water sources dry up, villagers and even some in urban areas rely on back waters that are contaminated (Atinkpahoun et al., 2020; Assogba and Dain, 2017). Water pollution, which is often due to human activity also contributes to water crisis in most urban and rural areas of Benin. The major polluting activities include the indiscriminate disposal of industrial, municipal, domestic and agricultural wastes in water channels, rivers, streams, and lakes (Aime et al., 2018).

2.2.4.1 Public-Private partnerships in Benin

In an effort to address the country's water problems, the government of Benin has shown political will, which often is a lip-service with other governments. The government's priority was to resolve the pressing water supply and distribution, especially in rural areas. For the Benin government, universal

access is not only about construction of water supply systems, but also about guaranteeing the quality of service and professionalism in the management of water supply services (Comair et al., 2022). To attain the above, Benin government pioneered an innovative model of water service delivery under which the private sector is responsible for operating and maintaining water delivery services, but not for financing the investment (Comair et al., 2022). The government, together with its agency the Benin Water Partnership have mobilised support from non-governmental organisations and civil society to help define a roadmap and vision of the planning process towards better water resources management (Comair et al., 2021; Aime et al., 2018).

The government of Benin and development partners focused on reducing the number of people without access to potable water, through a decentralisation process. The government established the National Rural Drinking Water Supply Agency, whose overall objective was to implement the government policy of universal access to drinking water. The new agency was tasked with focusing exclusively on remote areas of the country (Takouleu, 2019). The agency would spearhead drinking water solutions in rural areas, and organising public-private partnerships (PPPs) that should assist the projects to be financially structured (Comair et al., 2021). The idea was meant to reorganise water at communal level. Through the agency, Vergnet Hydro Forag SA, a French company based in Benin, and Agire Sarl, a Beninese company, jointly implemented a drinking water project in the eastern town of Borgou, by constructing a drinking water infrastructure to serve 35,000 villagers (Comair et al., 2022; Atinkpahoun et al., 2020; Takouleu, 2019).

The decentralisation process has affected water policies and supplies. Water committees were created to manage these sources and to charge users (Heidecke, 2006). To support the government in these ambitions, the Global Water Security and Sanitation Partnership (GWSP) provided technical assistance to the World Bank International Development Association (IDA) - financed AQUA VIE Program for Results (PforR) (Comair et al., 2022). Because of these initiatives water service in rural areas stand at 73% countrywide, a rural water supply coverage which is higher than in many other African countries. Together with development partners, the government intends to equip villages in the 77 municipalities with manually-operated pumps, with areas along the borders with neighbouring countries receiving priority, particularly schools and health centres (Comair et al., 2022).

Agbon and Galata villages were some of the recipients of the manually-operated water pumps. In the two villages, distance to water points was reduced and the number of waterborne diseases also decreased. In Galata, the number of waterborne diseases dropped from 40 recorded in 2005 and 2006, to 20's in 2007 and 2008 respectively (Assogba and Dain, 2017). In Agbon, a regressive trend

was also recorded. According to the available data, the number of sick people decreased from 35 in 2007 to 25 in 2008 (Assogba and Dain, 2017).

In villages that have the manually-operated water pumps, such as in Tatonougo, the villagers alternate visits to the well every two days to prevent water from becoming a source of conflict (Assogba and Dain, 2017). In each of the villages a water management committee comprising old and young; men and women was established and trained in water and sanitation issues; and maintenance of the installed pumps. According to Foussemi (2009), one of the major accomplishments of the water projects in the two villages, was the new type of leadership in the governance of beneficiary populations, which included the young and the old. This new type of leadership that included young and fresh ideas; and indigenous knowledge, was tasked to work together to manage the community water project, a responsibility that was once the exclusive domain of the elders, as determined by a social hierarchy based on age Foussemi (2009). Since the decentralisation process, the municipalities and their established Water User Associations became responsible for operating and maintenance of water supply and sanitation (Foussemi, 2009; Heidecke, 2006; Aime et al., 2018). The villagers play an important role in maintaining the pumps. Residents make financial contributions each month towards maintenance of the pumps and buying of required spare parts (Assogba and Dain, 2017; Foussemi, 2009). The government approach to address to water crisis ensures community inclusion in the administration and operation of the water points (Comair et al., 2021; Foussemi, 2009; Aime et al., 2018).

Water crisis is largely caused by poor planning and management, which means that any activity that is not regulated could result in negative impact on social, economic and environmental aspects (Maingey et al., 2022). Therefore, planning and management of water resources are critical for sustainable water usage and avert water crisis. Poor access to safe water directly or indirectly results in decreasing human productivity and living quality. The resulting water resource shortage limits further development. Hence, its provision is central to poverty alleviation (Liu et al., 2019). In the face of climate change, the vulnerability of rural communities to water crisis is intensified by their weak coping capacities in terms of poverty, lack of infrastructure, as well as overdependence on climate-sensitive resources. Communities are more likely to resort to conflict as climate-induced water shortages continue to rise, (Maingey et al., 2022).

The next section looks at general water supply in South Africa and the accompanying legislation.

2.3 WATER SUPPLY IN SOUTH AFRICA

Based principally on physical descriptors such as climatic conditions and increasing water demands, South Africa is a water-scarce country, (Muller et al., 2009). The country is ranked the 29th driest country out of 193 countries (Muller et al., 2009). “South African precipitation concentration has been observed to exhibit variability in space and time. The country experiences precipitation that varies significantly between the western and eastern regions. Annual precipitation in the north-western region often remains below 200 mm, while much of the eastern Highveld receives between 500 mm and 900 mm (occasionally exceeding 2000 mm) per year,” (Botai et al., 2017). However, according to Schulze et al., (2007), the average amount of precipitation is not a deterrent for successful water resources operations. “While the amount of precipitation received may be a cause for concern the temporal precipitation variability seems to be a critical dimension in South Africa’s water scarcity,” (Botai et al., 2017). In addition, droughts are recurrent because of unpredictable climate, which has made South African precipitation concentration to be highly irregular in most parts of the country (Schulze et al., 2007).

Ironically, with little freshwater sources, South Africa uses more water than most other countries (Botai et al., 2017). According to Hedden and Cilliers (2014), “South Africa withdraws 15,6 km³ of water per annum. The agricultural sector is the largest user of water, accounting for 57% (8, 9 km³) of total water usage. Municipal demand accounts for 35% (5, 5 km³) of water usage and the industrial sector accounts for the remaining 8% (1, 2 km³).” This means the country is overexploiting its renewable resource and failing to balance the water system, while at the same time treating less than 60% of its wastewater (Donnenfeld, 2018). The average water consumption per person in South Africa is 235 litres, compared to the global average of 173 litres per person per day (McKenzie et al., 2012). The water scarcity in South Africa is not mostly caused by physical drivers, but is also caused by economic factors. Economic water scarcity is mainly caused by lack of investment in infrastructure or technology that could be used to draw water from rivers, aquifers or other water sources. In addition the water crisis is exacerbated by lack of human capacity to manage the supply and demand for water (Schulze et al., 2007).

South Africa’s history of apartheid policies deprived many rural areas access to basic services such as water supply and sanitation services (Masindi and Duncker, 2016). In eradicating these historical distortions numerous programs have been initiated since 1994. Some of the initiatives taken are detailed below.

2.3.1 Correcting wrongs of the past

The government of the African National Congress (ANC) that assumed power in 1994 was seized with urgency to correct the inequalities and discrimination policies of the apartheid regime. One of these policies was to ensure equal access for all to safe and clean water. A 2005 document from the Department of Water Affairs and Forestry (DWA) on water allocation stated:

The department must promote the beneficial use of water in the best interests of all South Africans. The allocation of water should, therefore promote equity, address poverty, generate economic growth and create jobs. The water allocation process must also recognise that redressing the effects of previous discriminatory legislation also provides social stability, which in turn promotes economic growth. Moreover, the water allocation process must allow for the sustainable use of water resources and must promote the efficient and non-wasteful use of water (DWA, 2005).

In order to ensure fair water distribution and supply, the water allocation document, prioritised the participation of all stakeholders in the allocation process as well as provide support for productive water use (DWA, 2005). Therefore, participation of citizens in development, especially, in transforming service became the governing party's main priority, coining 'People First' mantra. Eight guiding principles known as Batho Pele were crafted to guide the public service in discharging service delivery to the people. The eight principles were: consultation; service standards; courtesy; access; information; openness and transparency; dealing with complaints; giving best value, and active participation of people (Kariuki and Reddy, 2019).

2.3.1.1 SA legislation on water management

2.3.1.1.1 Constitution of the Republic of South Africa Act 1996 (Act 108 of 1996)

In pursuance of correcting wrongs of the past, Chapter 2 of the South African Constitution states "Everyone has the right to have sufficient food and water". The Constitution sets out the objectives of local government, including to provide water services sustainably and to promote a safe and healthy environment (Adam and Simatele, 2021). In order to give effect to this right, the government enacted the Water Services Act 108 of 1997. The purpose of this Act was to provide for the right to basic water supply and basic sanitation services (Water Service Act, 1997). The Act states "Everyone has a right of access to basic water supply and sanitation services; every water services institution must take steps to realise these rights; and every municipality must put in place water services development plan to ensure that these rights are realised," (SAHRC, 2018).

2.3.1.1.2 National Environmental Management Act (NEMA) 107 of 1998

The NEMA, 107 of 1998, is a national environmental management framework legislation that defines the environment as the surroundings in which humans exist and includes land, water, and atmosphere.

2.3.1.1.3 Water Services Act (WSA) 108 of 1997

The WSA 108 of 1997 is the fundamental governing framework for water services institutions, which are primarily municipalities, giving effect to the Bill of Rights by providing for access to essential water supply and sanitation services necessary to secure sufficient water and an environment not harmful to human health or well-being (Adam and Simatele, 2021). The Act deals explicitly with water services or potable water and sanitation services provided by municipalities to households and other municipal water users. It embraces guidelines and regulations regarding what and how municipalities ought to supply water and sanitation services (Adam and Simatele, 2021). The Act outlines the municipal roles of guaranteeing water services provision and sets out strategies for the WSA as well as Water Service Providers (WSP). The functions and responsibilities of both WSA and WSP in terms of water resource management are not openly specified but can be inferred from their diverse roles in the provision of water services (Adam and Simatele, 2021).

NEMA and WAS are linked to the sixth objective of the Sustainable Development Goal 6 (Clean Water and Sanitation), which is the cornerstone of social and economic development as well as alleviating poverty and enhancing sustainable livelihood (Adam and Simatele, 2021).

2.3.1.1.4 National Water Act (NWA) 36 of 1998

NWA is a key policy strategy, enacted to address equity and sustainability (Adam and Simatele, 2021). The reforms introduced by the NWA require equitable allocation of water to all water users, and it places importance on managing the effects of water use on land, especially the water environment and resources. The NWA identifies 11 types of water use, which may have a detrimental effect on water resources (Adam and Simatele, 2021). Water uses in sections 21(f), 21(g), 21(f), and 62 relate to the management of Wastewater Treatment Works. In other words, The NWA 36 of 1998 strived to transform how water was controlled and managed, from a system of rights based on land ownership (the riparian system) to a system designed to allocate water equitably in the public interest (Adam and Simatele, 2021). The progressive reallocation of water to sectors of society that were previously excluded from access to water can help to bridge the divide between the first and the second economies, while maintaining existing beneficial water uses and encouraging greater efficiencies needed in our dry country (Adam and Simatele, 2021). With the promulgation of the NWA in 1998, groundwater lost its previous status of private water and became public water.

2.3.1.1.5 National Water Resource Strategy (NWRS) of 2004(1) and 2013(2)

The NWRS of 2004(1) is a crucial document and a legal instrument for implementing or operationalising the NWA (Act 36 of 1998). The first edition of the NWRS defined the fundamentals of integrated water resource management and presented a clear perspective of the water situation in South Africa and the critical interventions required (Adam and Simatele, 2021). It is a binding document on all authorities and institutions implementing the Act. It is a crucial document that provides the framework for the protection, use, development, conservation, management, and control of water resources for the country as a whole (Adam and Simatele, 2021). It also provides the framework within which water is managed at the provincial, regional, or catchment levels in the defined WMAs. Furthermore, this policy document provides relevant information about how water resources will be managed and the institutions to be established. It also provides quantitative information about the present and future availability of, and requirements for, water in each of the 19 WMAs. The key components and drivers of the NWRS of 2004 are its progressive decentralisation of the responsibility and authority of water resource management to catchment management agencies and, at a local level, to the water user associations. These institutions, representative of water users and other stakeholders, facilitate active participation in the management of water resources in their areas (Adam and Simatele, 2021). The NWRS provides the Department of Water and Sanitation to make a shift from its current multiple roles as an operator, developer, and regulator to become the sector leader, policymaker, regulator, and monitor. In addition, the NWRS of 2004 provides a platform for essential collaboration and cooperation among all departments in all spheres of government involved in economic development. The NWRS 2013(2) has been developed within a changing environment and acknowledges that monitoring and collecting relevant data will not only provide accurate assessments of the status of water resources and the magnitude of water problems but also vastly improve planning and policy formulation processes (Adam and Simatele, 2021).

Under the National Water Act, each household was entitled to 6, 000 litres of water per month. And the water source should be within 200 metres of the stand. However, excess usage of water above the set limit would have to be billed to the user (SAHRC, 2018). In simple terms this meant that the more one uses water, the more one has to pay. Section 27 (2) of the Constitution meant that while the State is not obliged to provide water freely, it is however, “under an obligation to create mechanisms that enable people to have access to sufficient water. 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 shall be achieved over time,” (SAHRC, 2018).

These water legislations have been hailed by the international water community as one of the progressive pieces of global legislation with some sections of the policies included in China's and Zambia's new water policies (Adam and Simatele, 2021). However, despite the elaborate water policies, access to clean and safe water is still a struggle for South Africa's marginalised communities. Water as a human right is violated especially in rural and informal communities, which gave rise to this research project.

Access to water implied that water should be both economically and physically accessible, and municipalities were charged to ensure that people under their jurisdiction experienced that right to water. According to the SAHRC (2018) "There is a duty on all spheres of government to ensure that water and sanitation services are provided in a manner which is efficient, equitable and sustainable. All spheres of government must strive to provide water supply and sanitary services sufficiently, for subsistence and sustainable economic activity." Therefore, the roles of all spheres of government were split as follows national government would manage water resources through various water boards; while municipalities assume responsibility for the delivery of water and sanitation services and draw up plans for such deliveries. These municipality plans were supposed to take into account effective delivery services to informal communities (Adam and Simatele, 2021). Because of lack of resources the government could not provide these services to everybody immediately, therefore, the government had to develop a clear plan with clear timeframes and budgets to provide these services and increase access (SAHRC, 2018).

Emphasis was placed on the physical accessibility, which meant that water would be available within a reasonable distance to everyone including vulnerable individuals such as children, the elderly and people with disabilities (Masindi and Duncker, 2016). In addition, the infrastructure should be adequate, with effective maintenance of facilities and equipment, and equitable access even for under-serviced areas (SAHRC, 2018). However, in its efforts to re-allocate water to achieve equity, the government had to play a balancing act. Haste or haphazard re-allocation could harm the economy or cause environmental damage; while slowness could result in social and political pressure to quicken the pace, which could destabilise the process (Masindi and Duncker, 2016).

Nevertheless, several protests related to lack of basic services such as water, indicates that the pace to equalise access to water has been slow. The government's short term plans of tankering – providing communities with water tanks, are proving ineffective as the supply system is riddled with corruption. Therefore, denying people their right to water in sufficient quantities and within reasonable distance is depriving them the right to live in dignity. Although government through local authority

structures makes an effort to fulfill the human right to water, indications on the ground are that the most vulnerable groups in society do not have access to clean and adequate water.

In Mtititi, outside Thohoyandou in Limpopo, there is a government housing scheme of 650 houses built in 1999 with water taps inside the houses, but the residents have never drawn water from those taps (Chiguvare, 2022). The community used to rely on a borehole that stopped functioning in 2020. Therefore, the residents had to rely on one of two 5 000-litre Jojo tanks in Muhunguti, also a few kilometres away. One of the tanks broke down in 2016, and has never been repaired since then. Vhembe District Municipality (VDM), which is responsible for supplying the village with water, promised to fix the tank but never fulfilled that undertaking (Chiguvare, 2022). The only tank that is intact has not been filled for the past five months, forcing villagers to buy water at R5.00 (US\$0.26) per 25 litres from private sellers (Chiguvare, 2022). An official with Vhembe District Municipality, said that they were working on a plan to resolve the water problems in the area, such as identifying underground water sources (Chiguvare, 2022). While the municipality is yet to identify underground water sources, there is Nandoni dam, not far from Mtititi, which is 100% full, but the municipality fails to transfer water from the dam to the community.

2.3.2 Causes of water scarcity in South Africa

The water scarcity in South Africa is caused by a combination of physical and economic drivers, which are lack of investment in water infrastructure or water technology (Botai et al., 2017). There is also the problem of skills shortage within water entities to manage the little water that is available (Botai et al., 2017; Muller et al., 2009). The apartheid system of governance also contributed to the existing water distribution and supply policies (Masindi and Duncker, 2016). Therefore, to eradicate the inequalities and socio-economic distortions of the past, numerous policies (outlined in section 2.3.3) have been initiated since 1994 (Adam and Simatele, 2021; SAHRC, 2018; Botai et al., 2017; Masindi and Duncker, 2016; Muller et al., 2009).

Of all the water that South Africa draws, 1,580-million cubic metres of water (equivalent to US\$418 million) is lost each year through leakages and inadequate infrastructure, with some municipalities losing more than 50% of its freshwater (Donnenfeld, 2018). In the midst of such leaks, Leonardo Manus, Acting Deputy Director-General of Regulation Compliance and Enforcement, in the Department of Water and Sanitation, said “A municipality had the audacity to request a 40% increase to its water supply allocation, when 65% of its existing supplies were being lost to leaks,” (Carnie, 2022). Manus questioned the logic of putting additional strain on resources when municipalities were not looking after existing supplies.

2.3.3 Solutions to SA water problems

Despite elaborate water policies, evident inequalities in water infrastructure delivery persist between rural and urban areas. This is mainly because rural provinces and small towns have relatively high water-infrastructure backlog and low water service reliability (Botai et al., 2017; Masindi and Duncker, 2016). However, Stats SA (2019) noted some slight improvements in access to water that increased by less than four percentage points between 2002 and 2018, climbing from 84, 4% to 88, 2%. “The increases were much more notable in Eastern Cape +17, 8 percentage points and KwaZulu-Natal +10, 0 percentage points. Despite these notable improvements, access to water actually declined in five provinces between 2002 and 2019. The largest declined was observed in Mpumalanga -5, 3 percentage points, Limpopo -3, 8 percentage points and Free State -3, 7 percentage points. An estimated 44, 9% of households had access to piped water in their dwellings in 2019. A further 28, 5% accessed water on site while 12, 2% relied on communal taps and 2, 5% relied on neighbour’s taps. Although general households access to water improved, 3, 1% of households still had to fetch water from rivers, streams, stagnant water pools, dams, wells and springs in 2019,” (Stats SA, 2019). In 2019, the investment differences were glaring, with predominantly rural provinces still lagging behind; thus subjecting rural households to economic water scarcity. The South African government has already pointed out that there is not enough money to address the country’s looming water supply shortages. The only option available for the government is to start collaborating more closely with the private sector to raise funds for new infrastructure and rehabilitation of existing projects (Carnie, 2022).

2.3.3.1 Tapping underground water

For South Africa, and the rest of Africa the solution to water crisis lies in the ‘sea’ of underground water in some of the driest parts of the continent (Naik, 2016). Investing in underground water is an effective alternative against the effects of climate change. While, underground water might not be the answer to Africa’s water shortages, it is an important coping strategy in the face of steep increase in demand for water, this as the continent’s population increases (Naik, 2016).

2.3.3.2 Capital investment

To boost water supply, there is need for capital investment in underground and surface water infrastructure (Hedden and Cilliers, 2014)). Though distance from existing centres of demand could be a costly deterrent to investments. Because of the over exploitation of surface water, ground water offers potential of increasing supply, especially in rural areas (Naik, 2016; Hedden and Cilliers, 2014). Municipalities could partner with the private sector and/or non-governmental organisations for increased investment in water infrastructure. Besides investing in infrastructure, Donnerfeld (2018)

believes the answer to South Africa's water problems is in teaching people the importance of water that would result in decline in overall consumption; and also in treating more of the country's wastewater.

2.3.3.3 Fixing water leakages

As already mentioned water leakages cost billions of dollars, therefore fixing the leakages not only saves money but water as well. According to Majumber (2015), members of the community can also assist by reporting the leaking taps as well as the illegal water connections. The community can set a committee that is responsible for detecting and repairing leaks. The exercise should also include replacing old infrastructure. Communities should be taught the value of water and saving techniques.

2.4 SUMMARY

The chapter opened with a global outlook of the water challenges; and then zoomed into specific case studies China, India, Kenya and Benin exploring the water challenges in parts of those countries and how they are dealing with the crisis. The chapter then looked at the South African water situation in more detail, the laws promulgated to ensure access to water for all as human right is attained; and the challenges being faced in fulfilling that mandate. However, despite all the novel water policies millions of South Africans do not have access to water. The next chapter looks at how this research was conducted.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter details how the research was conducted. Topics covered in the chapter are: research methodology. For this study the researcher pursued the qualitative approach, which is normally used when studying people in their natural settings. Research design, the overall plan that details the elements selected to answer the research questions. There is a section on the study area that details the geographic boundaries; the socio-economic life pursued and the general demographics of the area. From the study area, the researcher came up with the research population and the sampling method used to select research participants. The data collection section explains how data was collected. The study used both secondary and primary data. The data collection methods included literature review, one-on-one interviews, and observations. The section on data analysis details how collected data was analysed to come up with a conclusion. The last two sections ethical considerations and research limitations explain the ethical standards followed and any elements that could have affected or restricted research methods and analysis of the research respectively.

3.1 RESEARCH METHODOLOGY

Rajasekar and Verma (2013) states that research methodology is a systematic way of how research is conducted and procedures by which researchers go about their work of describing, explaining and predicting phenomena. Research methodology allows the researcher to select methods, materials, scientific tools and techniques relevant to probe the problem at hand (Rajasekar and Verma, 2013). The methods that are available are quantitative, qualitative and mixed method, which mixes some elements of both qualitative and quantitative methods. The method selected should provide guidance to the rest of the research - data collection tools, and analysis. For this study, the researcher employed mostly qualitative approach with an element of quantitative approach. Qualitative research is often used when the problem being investigated requires a deeper probe and understanding (Bless et al., 2014). Qualitative methodology gives the researcher some flexibility. While in the field, a researcher can increase the number of participants because of new information that has surfaced and also include other information collecting methods, that were absent in the initial plan (Pultz, 2018). This is done to gain more insights into the phenomenon under investigation. The qualitative methodology also entails studying people in their natural environment. A fixed research design or deductive approach does not have the flexibility required to take new insights into consideration.

Therefore, qualitative methodology was appropriate because this study sought to understand the nature of water crisis in Ipelegeng Township, which required probing different people in their own natural environments and observing them leaving their homes to water points. The quantitative aspect of the study was through a questionnaire for demographic purposes. The purpose was to seek basic information about the respondents and understand where each person fits in the general population.

3.2 RESEARCH DESIGN

Research design is the framework or plan that is used in collecting and analysing data that will answer the research questions (Bless et al., 2014). A research design is therefore, a map developed to guide a researcher (Pandey and Pandey 2015). Therefore, the research design for this particular study was based mainly on the qualitative approach with a touch of quantitative method and the associated data gathering techniques literature review, interviews, questionnaires and observation; and thematic data analysis technique. The research design selected allows for flexibility on the part of the researcher, especially with data collection one can go to and fro until data saturation, as new insights into the phenomena are gathered through interviews and observations (Pultz, 2018; Bless et al., 2014; Pandey and Pandey 2015).

Literature review enabled the researcher to compare and contrast different case studies of water crises from various countries. More importantly, the case studies provided lessons in combating water crisis for the study area. Interviews in the study were conducted for insight into the water problem in the township, while the questionnaire was also used to obtain demographical data of the respondents.

3.3 STUDY AREA

Ipelegeng Township, also known as Ward 5, is located in Mamusa Local Municipality in the North West province. In Figure 3.1, Ipelegeng Township is located on the western outskirts of Schweizer-Reneke.



Map 3.1 Map of Mamusa Local Municipality (Courtesy Google Maps)

Ipelegeng Township is made up of eleven sections. In terms of language, while there is diversity, Setswana is the main language spoken in this rural area. The township which, has a few churches, seven public primary and three public high schools, and privately owned retail shops, has a population of about 42, 226 people (Moedi Consulting Engineers, 2021). There are also RDP housing developments in Ipelegeng. The community’s main water source is Wentzel Dam. In terms of income, most of the people in Ipelegeng Township work on commercial farms that grow maize, cotton, groundnuts, sunflower seeds and soybeans. Other farms are into livestock specialising in cattle and sheep breeding (Moedi Consulting Engineers, 2021). Some of the people work at nearby diamond mines in Schweizer-Reneke; and in various smaller businesses and industries.

3.4 POPULATION AND STUDY SAMPLE

According to Bless et al., (2006: 19), “population is the entire set of objects or people, which is the focus of the research that the researcher wants to determine some characteristics.” According to Stats SA (2019) Ipelegeng is divided into Slovo; Extensions 4; 5; 6; 8; 9; Number 2; Kathrada; Charon; 600; and Makhala. The sections are almost clustered together, divided by roads. The total

number of households is 9, 829 (Statistics S.A, 2016). Therefore, the population for this study included any members of the Ipelegeng community both men and women from any of the eleven sections, who were willing to participate, and were 18 years or older. Participants should have lived in Ipelegeng for more than 10 years, to possess adequate knowledge of the water crisis. Because of the closeness of the sections, the study set a minimum of 20 households and maximum of 33 households, from all the sections to participate in the study. Initially, the study was supposed to cover all the eleven sections, however, households from three sections Extension 4, Extension 7 and Khathrada refused to participate, even after being assured of confidentiality. However, their refusal did not impact on the research, as the number of minimum households used as unit of analysis was attained.

3.4.1 Sampling method

Sampling is a process of selecting a portion or representative unit of the entire population that is going to be studied through interviews, focus group, observation or questionnaires, (Maree, 2014). For the selected portion or unit to be representative, it should retain the characteristics and qualities of the whole population. Researchers often work with a sample of the population because they rarely have access to the entire population and in some cases because of the size of the population, the research process might be strenuous and time consuming. Therefore, researchers use a sample of the population that is accessible to them to analyse a phenomena being experienced by the research population (Maree, 2014).

There are two sampling methods probability and non-probability. In non-probability sampling the likelihood of including every component of the populace in a study is unknown. Probability or random sampling is the point at which the probability of including every component of the populace can be resolved or determined (Bless et al., 2014). Through probability sampling, a researcher might be able to generalise findings based on the sample to the entire population. Therefore, for this study, instead of focusing on the 9, 829 households, simple random sampling was used to select 33 households from the eleven sections of the township. This meant that every household in Ipelegeng Township had an equal chance of participating in the study. In this case, the researcher used the lottery method for each section to select three households per section. Home addresses of each section were placed in a container and three addresses from each container were drawn. In total 33 home addresses were picked, however, nine households from three sections Extension 4, Extension 7 and Khathrada refused to participate. Two more selection processes were done for the three sections, but still no household was willing to participate in the study, even after being told that their identities would remain anonymous. Others feared political reprisals if they were seen participating in

interviews. Suggested alternatives to one-on-one interviews such as telephone interviews were also rejected.

In each of the selected households, only one participant who had lived in the township for 10 years or more participated. At each household, the process and purpose of the study was explained to the participant, with emphasis on the informed consent, which assured participants that their involvement in the study was entirely voluntary; and that there was no monetary reward for participating. The participants were also informed that they should feel free to withdraw at any time, including withdrawing information already shared with the researcher.

Initially, the study started with 24 participants. However, during the course of the research four participants, one each from Extensions 6 and 9; and two participants from Crossroads exercised their right to withdraw from the research process. No reasons were provided for their withdrawal, though the researcher suspected that the withdrawals were done after the participants realised that there were no monetary gain for taking part in the study. Therefore, a total of 20 participants finally took part in the study. The breakdown of the participating sections is depicted in Table 3.1.

SECTION	HOUSEHOLDS PARTICIPATING IN STUDY
Extension 6	2
Extension 8	3
Extension 9	2
Extension 12	3
Charon	3
Crossroad	1
Makhala	3
Slovo Section	3
TOTAL	20

Figure 3.1 Number of participants per section

The 20 participants whose identities remain anonymous were numbered 1-20. Besides the 20 participants from the community, the researcher also included the ward councillor, community leader, municipal; district; and provincial government officials. Because of their public offices, the ward councillor, community leader, municipal official, district official and provincial official were selected

purposively. Purposive sampling is based entirely on the judgment of the researcher who selects elements within the population with specific characteristics related to the study (Bless et al, 2014). In this case, the researcher wanted to interview leaders within the community regarding the water crisis in Ipelegeng Township. The councillor is a political leader; the community leader serves as a bridge between the community and local government; while the municipal, district and provincial officials are more technocrats. In the research report, the five officials are referred to ward councillor; community leader, municipal official, district official and provincial official.

Each of the 25 participants – 20 from the community and the five officials participated in the scheduled 60-minute interviews. However, some of the interviews with community members were less than an hour; while interviews with the councillor, community leader, municipal, district and provincial officials lasted for more than an hour.

3.5 DATA COLLECTION

There are two types of data, primary and secondary data. Primary data is original first-hand information collected by a researcher through various data collection methods such as interviews, observations and questionnaires (Pultz, 2018; Bless et al., 2014). The information collected is used to answer some pertinent questions raised by the researcher about a particular phenomenon. Secondary data is information that has been documented and stored for use by other interested people. Such data is found in books, journals, newspapers, online, magazines, electronic storage devices (Bless et al., 2014). In this study, the researcher used both primary and secondary data. Primary data was gathered through interviews, self-administered questionnaires, and observations; while literature review made-up for secondary data collection. Primary data for the study were gathered through one-on-one interviews with the 25 participants; self-administered questionnaire (Annexure 1); and observations. Primary data collection was important since there was little information on the water crisis in Ipelegeng Township. In the initial proposal, observations were absent, however, after driving around the different sections during the first familiarisation visit, the researcher decided to include observations including photographs. This flexibility was one of the advantages of using qualitative research method.

3.5.1 Primary data collection

3.5.1.1 Questionnaire

Participants who were selected and agreed to take part in the study were given self-administered questionnaires. These were mainly demographical questionnaires, meant to find out the gender, age,

income, educational level of the respondents. The questionnaires were handed out during the first visit and collected on the appointed day of the interview. All the respondents did not struggle filling in the information required and all returned the completed questionnaire on the appointed day.

3.5.1.2 Interviews

Service delivery is an emotive topic, therefore, one-on-one interviews helped to get the actual opinions through verbal and non-verbal communication. Such interviews, also called one-on-one interviews, are a popular form of collecting data (Pultz, 2018; Bless et al., 2014). For privacy and confidentiality the one-on-one interviews were conducted behind closed doors at the participants' own residences, while for the five officials interviews were done at the council, district and provincial offices. For the 20 community participants, the researcher made two visits, the first to acquaint with the household, where a participant who fulfilled the set characteristics was selected. The selected participant was offered a detailed brief of the study and provided with consent form to sign and a questionnaire to fill. The questionnaire was collected during the second visit when the interview was conducted. There was an option to conduct interviews with the community members at the council offices; however, all of them preferred the comfort of their homes. The interviews with the 20 participants ranged from 30 minutes to one hour. While interviews with the ward councillor; community leader; municipal, district and provincial officials were longer. This was necessitated by the need to close gaps.

The interviews were a combination of structured (Annexure 2 & 3) and unstructured questions that allowed for in-depth probing of the respondents. While structured questions guide allowed the researcher to ask same questions to community participants to get their views on the water problems, the unstructured format served as follow-up questions to probe further and seek clarity. During the interviews the researcher wrote down notes and also used a voice recording device, with permission from the interviewees.

Initially plans to secure security services from the community leader and ward councillor were aborted after participants objected to third parties during interviews. The security detail was also supposed to serve as an interpreter whenever there was need. However, all interviews were conducted in English, where the local language Setswana was used, the researcher who is conversant with the language was able to translate. All the data collected during the interviews were stored on a USB/memory stick. The researcher transcribed the notes from the notebook and voice recorder soon after each interview.

Since the study was conducted during the outbreak of corona virus, the researcher ensured that the prevailing lockdown level regulations at the time were adhered too. These included observing 1.5 - 2 metres social distancing, wearing face masks during interviews and sanitising hands. The researcher travelled around with extra face masks and a potable hand sanitiser in case participants required these.

3.5.1.3 Observation

Observation is a qualitative research technique that is used by researchers to observe the behaviour of participants, in their natural setting. During observation, the researcher would be taking note of what research participants are doing in the surroundings (Savin-Baden and Howell-Major, 2013). Through observation the researcher should be able to answer how or why something occurs within a particular setting. Observation helps to differentiate what people say, from what they really do (Savin-Baden and Howell-Major, 2013). The researcher used a combination of unobtrusive and participant observation techniques. The latter was used during interviews to observe non-verbal cues. The photographs used in chapter 4 are part of the observation process.

3.5.1.3.1 Unobtrusive observation

In unobtrusive observation the community might be aware of the presence of the researcher, but do not know why he/she is there. Because the researcher remains unresponsive and distant from the group's interaction, this nonreactive observation represents a more objective approach to data collection (Savin-Baden and Howell-Major, 2013). The participants remain anonymous.

Unobtrusive observation was mainly at water points in different sections of the township and the participants were people who came to fetch water at these points. The researcher was able to capture images of some of these observations. Through observations, the research was able to see people's reactions when water trucks fail to arrive their anger was triggered by waiting in a queue for most of the day. When a water truck arrived in Section 8 around 16:30 hours on one of the days, people were aggressive against the driver and were not patient for water to be filled in tanks. Instead they filled their containers straight from the truck. Where ever water was delivered residents were allowed to fill only three 25 litre containers. When there is surplus after everyone in the queue has filled, then those with extra containers could fill them.

Another fascinating observation made was that when the community members converge at a water spot, it does not matter what time it is, after waiting for a few hours, they can leave their containers in the queue, holding their places and no one can move another person's container. If the water truck

does not arrive, people come and take their containers home. Early in the morning before going to school, some of the children go to the water points to hold places for their parents. However, there are no preferences on who gets the water first. Everyone including the elderly and disabled have to join the queue. Interestingly, in all sections visited, the researcher observed that at the water points, there were more women than men. Even in literature, the burden of finding water falls on women. This prompted the researcher to conclude that water crisis has the face of women.

3.5.1.3.2. Nonverbal cues

During the interviews, the researcher also observed for non-verbal communication signs. This form of observation helped the researcher to see and understand the emotions of people, and compare these non-verbal cues with what the interviewees were saying. Through salient trends from non-verbal cues, the researcher was able to decipher information that was not loudly pronounced. Non-verbal communication provides honest and intimate information about people (Savin-Baden and Howell-Major, 2013). The researcher was able to observe emotions of people when responding to questions. This form of observation was only for interviewees.

3.5.2 Secondary data collection

Secondary data through literature review were used to frame the purpose and process of the study. Material from journal articles, book chapters, and online were used to outline the background to the study, setting the research problem and the theoretical frame of the study; tracing the problem of water crisis in other countries and how these countries were addressing the problem. Secondary data also featured in data analysis and discussion, locating findings within existing theoretical and methodological contributions.

3.6 DATA ANALYSIS

Data analysis involves cleaning mass of raw information with the objective of drawing an understanding and a conclusion to what was been investigated (Bless et al., 2014). Unlike in quantitative research that follows laid out procedures, in qualitative research data collection and analysis weaves through each other. When one starts collecting data, one also starts data analyses, which explains why a researcher has to go back and forth until all gaps have been filled. There is the fading out of the one and the gradual emergence of the other (Bless et al., 2014; Pandey and Pandey 2015).

In this study, data analysis was done manually using thematic data analysis. The analysis started by first browsing through the transcripts; then reading and re-reading the transcripts. The researcher noted the first impressions formed during the initial readings of transcripts. During further readings, the researcher was able to cluster familiar words, phrases, sections and sentences under different themes.

The thematic data analysis used in this study, is a common qualitative method that involves the identification of recurring themes from different types of data collection methods. The researcher identifies themes in the data and relationships between the themes (Pandey and Pandey 2015). In this study, a qualitative research design, therefore, allowed for a comprehensive analysis of the findings. Thematic data analysis dictates that data must speak for itself thereby allowing the participants to express their voices about the existing water crisis and offer solutions (Rajasekar and Verma, 2013; Pandey and Pandey 2015).

The next step was exploring the emerging themes, through a process of elaboration, which involved capturing the finer nuances of meaning that might have been missed during the initial coding system (Rajasekar and Verma, 2013; Pandey and Pandey 2015). Through this whole process, the researcher immersed or familiarised himself with the data. This allowed the researcher to understand the details and nuances of the data. One is immersed in data, the researcher becomes intimate with data, and that the analysis that emerges would make the strange familiar and the familiar strange (Rajasekar and Verma, 2013; Pandey and Pandey 2015). In this study, the community were concerned by the municipality's lack of interest in providing people with water. The community felt let down by their government from national to district level who only seems to act during electioneering periods.

The final step of the data analysis was putting together the themes into a written report that tried to capture the phenomenon that was studied. Since qualitative research focuses on processes, meaning and understanding, the end-product therefore, tried to be descriptive. Visuals were included in the report to enhance and support the written work.

3.6.1 Biographical information

For the questionnaires, since it was composed of close-ended questions, the researcher used the basic survey analysis. This allowed the researcher to split the respondents into subgroups based on

age, gender, educational level, income and sources of water. Twenty respondents completed the self-administered questionnaire and the subgroups are as follows:

3.6.1.1 Gender

Table 3.2, shows that more females were able to respond to the questions. In most cases males were at work, while females were at home doing house chores, hence the number of female respondents was high.

Male	Female
7	13

Table 3.2 Gender of respondents

3.6.1.2 Age of the respondents

Table 3.3 indicates three sets of age groups. According to the findings the respondents aged 18-28 years were three, those aged between 29-39 years were seven and the respondents aged 40 years and above were ten.

18-28yrs	29-39yrs	40+yrs
3	7	10

Table 3.3 Age of respondents

The three respondents in the first column were actually 28 years old at the time of the interview.

3.6.1.3 Educational level

Regarding the educational level of the respondents, Table 3.4 below, shows that half of the respondents had secondary education, while three of the respondents had some form of primary school education. Five of the respondents had acquired diploma/degree certificates. While two of the respondents received no education at all.

No education	Grade 1-7	Grade 8-12	Diploma/ Degree
2	3	10	5

Table 3.4 Educational level of respondents

3.6.1.4 Type of Income

In terms of income of the respondents, there was an equal number of those earning a salary and those on pension grant. While four did not specify their income.

Salary	Pension Grant	Others
8	8	4

Table 3.5 Income of respondents

3.6.1.5 Water Sources

With regard to water sources for domestic and other uses, many respondents rely on mobile water tanks while four participants have had access to boreholes, which have since ceased operating.

Bore hole	River	Lake pipe	Mobile water tanks
4	0	0	16

Table 3.6 Sources of water used by respondents

The mobile water tanks commonly referred to as Jojo tanks are a common site in the township.

3.7 ETHICAL CONSIDERATIONS

Ethics are a set of standards in research that help guide a researcher in how to interact with study participants (Chillisa and Preece, 2008: 228). Abiding by these standards ensures the quality, integrity and credibility of the study. According to Bless et al., (2014: 19), "ethical consideration refers to good conduct toward others or the branch of philosophy that studies good and bad conduct and the moral obligations or responsibilities we have toward others". Therefore, the researcher was guided by the North West University ethics policy. An application for ethical clearance to conduct the study was made to the university and granted. The researcher obtained a letter from the NWU Department of Development Studies that introduced the researcher and explained the nature of the study to the municipality and community leadership. The municipal manager in turn gave the researcher a letter that served as a passport into the community.

Access into a study area is a sensitive issue that requires a researcher to be ethical. Being ethical and courteous makes it easy for a researcher to establish trust, rapport and authentic communication patterns with the participants. The researcher, therefore, had a consent form that served as

assurance for the privacy of participants. Before engaging in interviews the researcher explained the purpose of the study and once the participant agreed to take part, he/she signed the consent form. The participants were informed of their right to withdraw from the research at any point, including information contributed.

Recruitment of participants for the interviews was conducted through simple random sampling procedure. Each section was supposed to contribute three households – one participant per each household. However, three sections refused to participate in the study process, while four participants decided to pull out of the process by exercising their right to withdraw.

Since the research was conducted during the period of COVID-19, a global pandemic, extra care was taken during interviews to ensure that the participants and the researcher were protected from cross-infection of the virus. Fortunately the field work was conducted when the government had eased movement of people, though some of the restrictions such as wearing of face masks, social distance and sanitising hands were maintained. Therefore, during the interviews, the researcher ensured that 1.5- 2 metres social distancing was observed; interviewees and the interviewer wore face masks and where necessary hands were sanitised. As a precaution, the researcher had extra face masks for distribution, in case an interviewee appeared without one. NWU COVID-19 Protocol was also attached to the consent form.

3.8 LIMITATIONS

The limitations are weakness of the study and elements outside the control of the researcher, (Maree, 2014). Research limitations reflect the shortcomings of a study, based on practical or theoretical constraints that the researcher encountered during the course of the study. These shortcomings might limit the researcher's findings and conclusion of the study. However, these limitations could present a foundation for future research. Initially, the researcher thought that COVID-19 restrictions could be a hindrance however, those fears were dispelled. Participants were cooperative with regards to the COVID-19 protocols.

Because of internal migration that often results in cross-cultures, and multiplicity of languages, the researcher feared language barriers. However, all participants were conversant in Setswana, which is widely spoken in the province and is also the researcher's home language. Participants mixed English and Setswana in their responses, which the researcher was able to deal with.

The only limitation in the research was three sections that refused to participate in the research. This meant that their voices are absent in the final report. However, from mere observation, all sections face similar water problems and all want a permanent solution to the water crisis. Another limitation was time and funding that caused the researcher to limit the unit of analysis.

3.8.1 Delimitation/s of the study

Delimitation reflects the choices that the researcher makes in terms of the focus and scope of the research aims and research questions; what the researcher includes and excludes in the study (Theofanidis and Fountouki, 2018). Delimitations serve as the boundaries of the study that the researcher controls; the limitations consciously set the researcher. These include issues such as the research title, research objectives and research questions.

Therefore, the researcher decided on this particular study and study area, because of the water protests that had become a feature on news bulletins. Therefore the researcher wanted to get an understanding of what was the actual cause of water problems in Ipelegeng Township.

3.9 SUMMARY

The study was conducted mainly using qualitative research methodology with an element of quantitative. Data collection was done through interviews and a questionnaire was used for the purposes of demographic information about the respondents. Data was analysed through thematic and basic survey analysis tools. The chapter also looked at the ethical aspects of the study and the limitations and delimitations of the research. The next chapter looks at the research findings.

CHAPTER 4

RESEARCH FINDINGS

4.0 INTRODUCTION

This chapter discusses what was obtained during the data collection process. The findings are in relation to the research objectives. Therefore, the chapter has three sections that reflect the research objectives: causes of the water crisis in Ipelegeng Township; role of stakeholders in the water crisis; and solutions to the water crisis.

4.1 CAUSES OF WATER CRISIS IN IPELEGENG TOWNSHIP

In this section, the researcher sought to find out from the respondents what they thought was causing the water crisis in Ipelegeng Township.

The community leader and ward councilor explained the magnitude of the challenge faced by the municipality, which include lack of capacity to handle the crisis. Lack of capacity often leads to corrupt activities.

Councillor said *“The biggest problem faced by the township is that the main source of water Wentzel dam dried up during the prolonged drought of 2012/2013, which resulted in the closure of the water treatment plant. This meant no water supply for Ipelegeng. However, when the dam filled up again, the water treatment plant failed because of neglect.”*

“Second, the municipality is under-resourced when it comes to the capacity of handling this matter and providing adequate access to water for people under our jurisdiction. Above all, this seems to result from corruption tendencies that have attacked our office, where public funds are misused, and water supply tenders are awarded to service providers who are not capable of delivering.”

Community leader *“The municipality does not have adequate resources or funding to ensure consistent treatment or maintenance of their water plant. This often results in corruption within the municipality, as some officials try to circumvent the system.”*

The Provincial government is aware of the water crisis in Ipelegeng. An official from the Provincial Government said *“Undeniably, one of the difficulties facing the municipality is lack of safe and reliable water supply with a high percentage of nearly 60%.”*

All the officials from the municipality, district and provincial concurred that the water crisis started after the main supplier, Wentzel Dam dried up because of drought. The 2013 drought was recorded as the worst in the 80 years. *“The situation was worsened by our own people who tempered with the asbestos cement pipes to communal taps for illegal connections; hence we have never had connections to individual yards for our residents,”* said the Provincial official.

The Municipal and District officials believe that usage of old asbestos cement pipes contributed towards inconsistent water supply in the Mamusa Local Municipality.

A District official said *“The community itself is the problem as well because amongst them, there are crime king-pins who constantly steal diesel that is used to pump water to the community.”*

A Municipal official said *“Mamusa Local Municipality is a small municipality it does not receive sufficient funding to address the water crisis.”* Thus contradicting the Provincial official who had said *“The municipality received R24 million from the District for the refurbishment of the water treatment plant.”*

4.1.1 Infringement of the right to clean and safe water

While both the councillor and the community leader were conversant with the responsibilities of the municipality regarding service delivery as stipulated in section 152 of the Constitution of South Africa and the Municipality Systems Act of 2000, they felt hamstrung by incompetent municipality workers.

Ward Councillor said *“I am committed to serving the people, but what can I do when one is working with self-serving people?”*

Community leader said *“Municipal workers are liars, I do not think they are qualified for the jobs that they do, that is why our service delivery is in shambles.”*

Councillor said *“The biggest challenge facing our workers is financial accountability. We got some funds from the District to improve our water situation, but no one can account for those funds.”*

The District official acknowledged that the current water situation does meet the legislative requirements in terms of individual and household access to water *“Because we have elderly*

personnel as part of our community, so it is improper and inhuman for them to have to walk meters to go fetch water from water tank at the street.”

All the 20 resident respondents recognise that access to clean and safe water is a right. A 24 year old single mother said *“I wish we could find money to hire a lawyer and file a class action against the government for violating our human right.”*

4.1.2 Poor maintenance of water sources

While municipal and district officials maintain that the repair and testing of all non-functional boreholes including drilling as well as equipping have been done. Majority of the respondents said that poor maintenance of water sources is the cause of water crisis in Ipelegeng Township.

Respondent 5 said *“The cause of poor water service delivery is poor maintenance of water sources. When the dam (Wentzel) became dry, the municipality neglected the reservoir and water treatment plant. Now that the dam has water, the other facilities need to be repaired so that water can start flowing.”*

Respondent 13 said *“Our water sources are not in good condition, hence poor water services delivery. Even the boreholes that we have no longer produce water, because they broke down.”*

Respondent 20 had this to say *“We have communal taps but we do not access water at all, it means the sources that should deliver water into our taps are not maintained properly. Of course at one stage water used to come out of the taps. But now nothing is coming out.”*

Most of the water sources and pipes are old and no longer function properly, for example, the community has a reservoir, but it no longer stores water because the treatment plant needs refurbishment.

“The engines that are in the community, sometimes do not produce water and we will be told that some parts of the engines are broken, and it will take the municipality a very long time to fix them”, said respondent 7.

These responses are supported by Nicholas and Peter (2005), who state *“The inadequate maintenance framework will influence water supply.”*

4.1.3 Poor management of temporary water supply system

The residents said that since there is no permanent source of water, the service provider contracted by the municipality does not timeously provide water trucks to fill tanks that serve as temporary water sources. A municipal official said that they have a total of eight trucks with the capacity of 10000 litres supplying about 60 Jojo tanks in the area. However the community said that at times they could spend days without water in the tanks. And when water is eventually delivered, residents would not be patient for the truck to fill the tanks. In addition, the participants said that the water trucks do not have a fixed time. That was true, because one day, a water truck got into one of the sections at 16:30 in the afternoon, and people had to scramble back to the water point after they had given up for the day.

Ward councilor, *“The agreement with the service provider was that all the tanks were supposed to be filled with water three times a day - early morning, afternoon and early evening. But to be honest, I have never seen any section that has had its tanks filled three times a day. In the past some areas could have their tanks filled twice and then reduced to once. Now it is just sporadic, no one knows when the water truck would arrive.”*

Community leader *“This temporary plan of using Jojo tanks has failed to work because of the service provider who is not effective. They used to give unreasonable excuses why water trucks were not coming until they became tired of their own lies. It is different, because with the previous service provider, all these tanks were filled at least once a day.”*

Picture 4.1 is a truck that was supposed to fill up Jojo tanks in Extension 6; however, because the residents had spent more than a week without water, they had no patience to wait for the truck fill up tanks at designated spots. The trucks draw water from boreholes in Geysdorp, about 60km from Ipelegeng Township.



Picture 4.1 Residents in Extension 6, filling-up their containers from a water truck (Own picture 05/02/2022)

For the respondents, the municipality's alternative water supply system is not working.

Respondent 2 *"The water trucks do not bring enough water to the community."*

Respondent 10 *"The water trucks do not stick to schedule. They only come at their own convenience, not that for all of us. For example, the truck yesterday came at 16:30 hours instead of coming in the morning."*

Respondent 18 *"The municipality does not provide us with enough water tanks."*

Respondent 16 *"Since our taps ran dry, every morning one has to queue up at a local sports ground. Imagine what could happen if residents of all extensions come to the ground expecting water and none arrive."*

The community has close to 60 Jojo tanks each with a capacity of 10, 000 litres, meaning if water is delivered timeously the residents should be able to access 60, 000 litres of water in the morning and another 60, 000 litres in the afternoon, which would cater for all their needs. However, that is never the case because tanks are rarely filled up.

One respondent stated that the water crisis in their area is caused by the JoJo tanks, which the municipality introduced as temporary alternative to piped water.

Respondent 4 said *“If all these Jojo tanks are filled with water according to the schedule, we would have no problems. But they have become a symbol of our daily struggles.”*

All respondents said that they have never experienced any moment when all the tanks were full either in the morning or afternoon.



Picture 4.2 People wait for water truck at a Jojo tank located in Extension 8 (Own 20/02/2022)

In Picture 4.2 only a few community members were able to fill their containers early in the morning. Others had to wait for the tank to be filled again in the afternoon, which never happened because the water truck did not come. According to the residents, the water tanks have failed to improve their situation.

Respondent 18 summarised the feeling of all other respondents *“Our situation is very painful because at times one waits in queue for hours for a truck that never comes – time that could have been spent doing something useful.”*

What Respondent 18 said is summed up in Picture 4.3 taken in Section 4, where people had queued since 04:00 in the morning, for a water truck that never came.



Picture 4.3 Community members in Section 4 eagerly waiting for water truck (own 25/02/2022)

Respondent 1 *“Because these tanks have failed to serve their purpose, therefore, out of frustration we have burnt some of the tanks. Yes this adds to our misery, but what can we do, when the alternative source of water is failing us?”*

Regarding the poor water supply to the tanks by the supplier the Provincial official said *“Temporarily the appointed water suppliers must be held accountable as the community has complained that sometimes the trucks do not arrive at all.”*

In another area of Section 4, the researcher actually witnessed some youth breaking the water tank. They wanted the iron stand used to elevate the Jojo tank from the ground. According to the youth, they were going to make money from the iron stand.

The study was conducted at the height of COVID-19, with the government like in many parts of the world promoting hygiene to tackle the pandemic. This is what respondent 3 had to say

“If corona (COVID-19) was real, the whole community of Ipelegeng should have been wiped out, because there was no water to wash our hands.”

“Not only corona, but it is a miracle that we do not have outbreaks of cholera, diarrhoea or other water related diseases. We do not know the last time we used our toilets. ”

In Extension 6, residents at one stage relied on one communal tap, which has since gone dry. Respondent 9 *“The engine that was supposed to be pumping water for the communal tap broke down.”*

A few areas in Ipelegeng have communal taps, which residents said do not produce enough water. Whenever, the taps produce water, there is always chaos, with residents lining up for 4-10 hours to fill just one 25-litre container.

Respondent 11 *“I would leave my house at 8am to get water and come back at 12pm because of the long queue”*

Other people in the community buy water from those who have boreholes in their yards; a situation which was confirmed by the Provincial official.

4.1.4 Corruption within the municipality

The respondents believe that the extent of corruption in the municipality is contributing to the water crisis. One stated that some time back the people who are supposed to bring water to the community would sell the water to them.

Respondent 2, 3, 5 & 19 alleged that some of the truck drivers demand payment for delivering water.

Respondent 18

“There is a lot of corruption going on within the municipality. Because each time a water truck comes, it makes stops at different houses, filling individual water tanks. By the time the truck arrives at designated spots, there is only little water left.”

Some also said that the municipality does not care about the community needs, rather they only want to use the money budgeted for service delivery for their own benefit.

Respondent 15 said *“There are some rich people in the community who take all the water that is meant for the community. We believe that these rich people bribe the municipality officials with money so that they can access water illegally.”* This is despite that some of the alleged rich people have their own boreholes.

Respondent 17 *“Others hire people within the municipality, so that they are given first priority whenever water comes.”*

On why the municipality cannot replace the service provider, for a better one, or even the previous one whom the community said was doing a better job, the ward councilor said:

“We have been trying to get the municipality replace the current service provider, however, it is proving difficult, because I think some of the workers are benefitting directly or indirectly. The other problem is that the boreholes where these trucks get water for the tanks are not always efficient. At times the breakdown and takes a bit of time before they are fixed. An audit did unearth some unethical practices regarding awarding of the water supply tender but no action was taken.”

4.1.5 Illegal connections

“Illegal water connection means any connection or reconnection to a system through which Municipal services are provided, which is not authorised or approved by the Municipality or an authorised official,”(Felbab-Brown, 2017). Illegal water connection is theft of water, which at times is difficult to detect and pinpoint. Such acts are often only discovered by accident or after proactive searching by the utilities.

Illegal water connections affect the water pressure along the pipelines, impacting on the flow as some of the piped water is lost along the way (Koner and Samanta, 2021). The municipal, district and provincial officials both agreed that the asbestos water pipes were tempered with by people seeking illegal connections. The tempering with water pipes also resulted in leakages.

Respondent 18 stated that illegal water connection is one of the causes of poor water service delivery.

“Those who have money in the community make their own water connections. As a result water is diverted to their houses, which they do not want to share with others. Instead they sale that water back to the community.”

Respondent 20 *“People resort to illegal connections because of inadequate and unequal distribution of water. You think if everyone had access to water, there would be any illegal connections? No.”*

4.1.6 Lack of communication

The respondents said that they blame the government for the water problems in their community, saying that during election periods, officials would be falling over each other trying to impress the community.

The district official said *“The municipality is constantly updating community on the progress and measures been undertaken through our mayor and councilors.”*

The provincial official explained the ideal engagement process, *“The community plays a very critical role and we encourage the involvement of communities and organizations in matters of local government. We have worked to establish good working relations with other spheres of government and key stakeholders like Local House of Traditional Leadership to maximize social development and growth. We usually promote public participation by reaching out to communities in presenting the draft budget for each financial year before the final approval by Council.”*

However the residents disagreed claiming that engagement with the community only comes when there is an election. Respondent 4 said *“During election time, there is plenty of information, with officials communicating about our water needs. But once elections are done, we are back to square one. Recently, we had a By-Election, and the township was very clean. Some sections even got water for the duration of the election, and then the water vanished after the election.”*

Respondent 6 said *“We are tired of empty promises and commitments that we would not struggle again to access water.”*

Respondent 11 said *“Outside election, our council has never come to address us or send some kind of communication about water – even to explain why water trucks are not coming or why our water tanks are empty.”*

Respondent 13 said *“I think there is lack of communication between institutions responsible for water provision for this area. Even the ward councilor rarely communicates or provides any updates on the water situation.”*

Respondent 12 *“If the municipality thinks they are big for us, why not communicate with our councilor, on a daily basis updating us about water. Just to say expect a water truck at such a time, or apologising for water trucks that failed to deliver water. But they just keep quiet, because they do not experience the same problems that we do.”*

Respondent 18 *"The municipal staff only come and talk to us when we protest, making empty promises."*

Respondent 20 *"They do come sometimes and lie to us."*

4.1.7 Differences between pre- and post-apartheid administrations

Some of the older respondents said that they had full access to water during apartheid regime.

Respondent 18 *"When the new government came in 1994 that is when we started to have water problems in this area."*

Respondent 4 said *"We never had water problems during apartheid until this new government came in and cut off the water."*

Respondent 15 *"Before independence in 1994, our taps had water, because the community was not as big as it is now. Municipal managers during that time made it their priority to maintain water sources and were accountable to the community. Currently no-one wants to take responsibility of the problem. There is also lack of leadership and corruption within this municipality."*

While the district official apologised on behalf of the municipality for the water crisis, he maintains that they are trying, *"The municipality is very remorseful about this constant failure towards the community. We are trying our best, so in the meantime our people should try as possible to preserve the little that is there for our self-sustainability."*

4.2 ROLES OF STAKEHOLDERS IN THE WATER CRISIS IN IPELEGENG

Regarding this question, the respondents entirely blame the municipality for the water crisis.

Respondent 12 *"The municipality are the custodian of this community, they are therefore responsible for giving us water. But what we fail to understand is why the municipality changed service providers, the previous one was working well, unlike the current one. It is like removing a running engine from a car and replaces it with a non-running engine. Obviously, the car won't move. This is our situation here. "*

Respondent 18 *"Municipal officials have failed to ensure that we enjoy our right to water."*

Respondent 19 *“The municipality is in breach of the social contract between the government and the people. The constitution specifies the amount of water that one requires, but we go for weeks without water. The fortunate ones rely on bottled water from shops and some fill up their containers from outside the community.”*

But one respondent thought differently.

Respondent 8 *“I think we are also to blame, because we allow illegal water connections. If we had a genuine community committee, this is one thing they should be addressing. However our committee is weak, it is powerless.”*

While accepting the blame for the water crisis, the both the municipal, district and provincial officials said that the residents should also shoulder part of the problem, as they vandalise the water equipment and promote illegal connections.

Ward Councillor, *“Obviously, according to the constitution, the municipality is supposed to provide water to people under its jurisdiction, and we have failed to deliver on that mandate.”*

Community leader, *“While the municipality shoulders much of the blame, we as the community also contribute to the problem. We have burnt the Jojo water tanks that were meant to ease our problem, worsening our own plight. And those youths in section 4 damaged the water tank just to steal the iron rods.”*

4.3 SOLUTIONS TO THE WATER CRISIS

The respondents offered several possible solutions that they believe would help end their water crisis.

4.3.1 Permanent source of water

As a permanent solution to the water crisis the respondents said that there is need for urgent investment in the rehabilitation of Wentzel Dam and increase the capacity of the water treatment plant. Besides the Wentzel Dam, respondents felt that sinking at least five boreholes in each sections of the township would be a better replacement for the failed tinkering system. With selected community members taught how to maintain the boreholes.

The Provincial official said that the municipality is working on bulk water supply from Bloemhof to Schweizer Reneke, which in turn will supply Ipelegeng Township. There is also the upgrading of groundwater supply in Ipelegeng and replacement of asbestos cement pipes. What the Provincial official said was actual a repetition of a media statement issued by the Provincial office 2016, "The Mamusa water crisis is currently, being addressed through water tinkering, whilst working on permanent solutions," (SA Gov., 2016).

Ward Councillor, *"This situation is very painful because most of our residents, especially, the new extensions have never had water connection to their yards. However, our main plan is to focus on the water pipelines from the main line in Delareyville to Ipelegeng, which will be our long-term goal as the municipality in making sure that the community get the water in their households. That would mean expanding the supply volume of the Mamusa bulk water pipeline. This of course has been on the table for a long time, because of funding issues. The municipality also received some funds from the district to refurbish the water treatment plant."*

"In the interim, we can lobby for increase in water tanks and ensure that these tanks are filled on a daily basis. We can also refurbish existing boreholes and drill more boreholes."

Community Leader, *"The municipality has had a number of plans to ensure water into houses, but these have just remained on paper. Yes, we can have more Jojo tanks, but without efficient and consistent supply of water from the service provider, these would be just what you guys call white elephants, that reminds people of what they are supposed to be getting but cannot."*

However, the residents said that for the past 10 years the local authorities have been talking about the bulk water supply, with no action on the ground.

4.3.2 Active community committee

Respondents were in agreement on the need to have an effective and empowered community committee. They said that one of the main tasks for the committee would be to keep water service providers on their toes.

Respondent 13 *"Each section must have its own committee and then a ward committee. These committees would be responsible for making the service provider accountable for their action. If water is not delivered in a particular section, the respective committee contacts the service provider or report to the ward committee."*

Respondent 5 *“I think the municipality is just enriching people without any accountability. Service should be provided first then payment later.”*

Respondent 10 *“The community committees should serve as water police, especially against illegal water connections. Because illegal connections steals; and when one steal from a community that person should be punished.”*

4.3.3 Water conservation campaigns

One respondent pointed out the need to educate people on the importance of water conservation and water management.

Respondent 20 *“There is need to educate people to value water, especially these days of climate change. Look at how much water is lost whenever people hijack a water truck. People would be fighting to fill their containers. And during that commotion hundreds of litres of water are lost.”*

The district official said *“We plead with community to protect the little resources that we have so that we do not end up filling an endless hole.”*

4.3.4 Improving communication

While the district and municipal officials claimed that the community is always updated on the progress and measures being undertaken, the residents think otherwise.

Respondent 1 *“There is need for frequent meetings between municipality staff and ourselves. If we call for meetings within the community these officials should attend. That is the only way for them to know our needs.”*

Respondent 3 *“Our ward councillor is almost like an absent councillor, because we do not see him. He does not call for ward meetings or section meetings. That is the problem of having a political party imposing an appointee on you. The person becomes answerable to the appointing office not the people being served.”*

4.3.5 Competent municipal staff

Two of the respondents believe the current municipal staff should be fired because they are not competent. They said that the current municipality staff are delaying development of water infrastructure.

Respondent 2 *“Those people sitting in the offices of the municipality are not doing their jobs, they should be fired.”*

Respondent 4 *“Municipality should hire competent people who deliver.”*

4.3.6 Protests

While all the respondents want a permanent solution to the prevailing water crisis, which they believe could take some time, they however, want the municipality to ensure effective and efficient temporary water supply measures. Their frustrations are over empty water tanks scattered around the Ipelegeng Township. Therefore, some of the respondents believe relief only comes through protests.

Respondents 7, 8, 11, 12, 17 and 19 said that the only way of getting attention from the officials is through protests. Hence, the frequent protests that characterise the township. In the past most of the protests in the township resulted in the destruction of public infrastructure including water tanks.

4.3.7 Proper maintenance of water infrastructure

The respondents said that the municipality should take proper care of their water sources. And ensure that the main line from the mainstream is restored and making sure the main line and the reservoirs are properly maintained. According to the District official the municipality has hired a 24 hour private security company to protect the water equipment and diesel at the reservoir. The councilor and community leader agreed on the need to empower the community committee, and make service providers accountable to the committee.

4.4 SUMMARY

This chapter detailed the outcome of the interviews held with the 25 research participants – 20 community members and five officials, who included the community leader, ward councillor, municipal officials, district official and provincial official. The responses were based on the broad research objectives. What emerged from the evidence presented was that there is indeed a water crisis in Ipelegeng, which is wholly man-made. While the drought of 2012/2013 played its part in the

drying up of the main supplier Wantzel dam, management of the temporary supply system are shambolic; and efforts towards a permanent solution have remained on paper since the crisis started. The next chapter discusses in detail the nature of the water crisis in Ipelegeng Township vis-à-vis the findings.

CHAPTER 5

EXPLORING THE NATURE OF THE WATER CRISIS IN IPELEGENG TOWNSHIP

5.0 INTRODUCTION

This chapter discusses the nature of the water of the crisis in Ipelegeng in relation to the findings and also within the context of the literature review and theoretical framework of this research. The discussion is centred on the research objectives – possible causes of water crisis in Ipelegeng Township; the role of stakeholder in the water crisis; and possible solutions to the water crisis.

5.1 CAUSES OF WATER CRISIS IN IPELEGENG TOWNSHIP

Earlier in section 2.0 of Chapter 2, mention was made of two types of water scarcity, physical, which is the absence of adequate water to meet all demands; and economic scarcity which is caused by lack of investment and management of existing sources. Various literature points out that effective management of water is critical for effective and efficient supply to households. Therefore, from the evidence presented in this study, the water crisis in Ipelegeng Township which is both physical and economic is real and wholly man-made. This conclusion to the study is supported by a World Water Vision Report, which states “The water crisis faced today in many countries is not about having too little water to satisfy human needs, but, is a crisis of managing water so badly with adverse effects on billions of people and the environment,” (Karanja, 2011). The residents and the government officials from the municipality, district and provincial all acknowledged the existence of the water crisis. Therefore, the situation in Ipelegeng, is a question of failing to do more with the little that is available. The township is water insecure because the residents lack the adequate quantities of water per day and in the process fail to satisfy basic needs such as sanitation and hygiene. Therefore, the community’s social access to water is limited by inadequate infrastructure. Because there is no water security in the area, this means that people’s right to water as stipulated in the Water Act of 1997, is being infringed upon. The social institutions that according to the social access theory were supposed to cultivate cooperation towards the sustainable management of the water resources are dysfunctional. Consequently, the Ipelegeng community instead of harnessing their social capital towards transforming their economic and social abilities, turned their anger on the temporary water infrastructure that seem to remind them of the real capacity that cannot be realised.

5.2.1 Poor maintenance of water sources

Poor management of water infrastructure is a precursor to poor maintenance of water sources. Like the drought of 2010 that affected water supplies in Cape Town (Booyesen et al., 2018; Cape Talk, 2016), and the 2013/14 drought that hit São Paulo (Getirana et al., 2021; Millington, 2018; Burt & Ray, 2014), the dam that supplied water to Ipelegeng Township also dried up following the 2015 drought. While the rains that fell in Cape Town and São Paulo revived the two cities, Ipelegeng Township also received some rains that filled up Wentzel Dam, however, the water supply problems continued. The water treatment plant that was closed during the drought needs to be refurbished after years of neglect. The borehole system that was introduced to bring relief to the residents has failed because of constant breakdowns. This supports the assertion by Ribot and Peluso, (2003) that limited or no social access to water can be caused by lack of maintenance or inappropriate infrastructure.

A similar problem of poor maintenance of water infrastructure also haunts Mtititi, outside Thohoyando in Limpopo (Chiguvare, 2022). The area has a government housing scheme of 650 units built in 1999 with water taps inside the houses, but the residents have never drawn water from those taps (Chiguvare, 2022). The community used to rely on a borehole that stopped functioning in 2020. Therefore, the residents were forced to fetch water from one of two 5 000-litre Jojo tanks in Muhunguti, also a few kilometres away. One tank has been broken since 2016. Vhembe District Municipality (VDM), which is responsible for water, promised to fix the tank but never has fulfilled that undertaking. The only tank that is intact has not been filled for the past five months, forcing villagers to buy water at R5.00 per 25 litres from private sellers (Chiguvare, 2022).

In India, most cities also face difficulties of water supply mainly because of the age-old water supply system that lack maintenance, which makes them fail to cope with the increasing demand (Koner and Samanta, 2021). The age old water infrastructure of Darjeeling city has resulted in unequal access among the different user groups in the area. The current water supply infrastructure in Darjeeling city, built during British colonial rule was meant for only a limited number of people (Koner and Samanta, 2021). Therefore, with expansion of the city and population growth, the infrastructure is no longer adequate to sufficiently cover the entire city.

In Lamu, Kenya, the area's piped water scheme only caters for a third of the population (Gedo and Morshed, 2013). Illegal water connections have increased the pressure on the system that often results in pipe bursts. And repairs of water pipe bursts at times take long, which affects water supply to the area.

The social capital theory focuses on harnessing of relationships within a community for their own benefit (Margaret et al., 2017), however, in Ipelegeng Township, the cooperative behaviour of the community was against resource management. In venting their anger over water, community members destroyed the temporary water structures provided by the municipality.

5.2.2 Poor management of temporary water supply system

Because of the 2015 drought the Mamusa Municipality introduced water tanks around the Ipelegeng community. Ideally, the tanks were supposed to be filled at least three times a day; however a service provider engaged by the municipality has failed to fulfill water supply mandate. According to the residents, the initial service provider who operated from 2009 – 2012 did try to ensure that all sections of the township had water. The residents said that their major water problems started with the current service provider, where water supplies became infrequent and at times sections would go for days with no water. Therefore, in Ipelegeng, social access to water is limited and restricted because of poor management of the temporary water supply system. The community instead of combining their capacities for strong community governance of the local water system destroyed the same structures meant to help them. The same problem is also been experienced in Mtititi, outside Thohoyando in Limpopo, where the municipality has failed to fill the only remaining water tank, forcing people to buy water (Chiguvare, 2022).

In Sao Paulo, Brazil, the management of temporary water rationing was shrouded in secrecy (Millington, 2018). Indirectly, the local authority introduced water rationing, which they did not want to admit in public. Slums in the outskirts of the city were mostly affected by measures to reduce water consumption. The pressure of water flow was reduced at night, however those with tanks, which is a common sight on rooftops of the city had little to worry about. However, those who could not afford to put a water tank on the roof because of a weak structure had to endure days without water.

5.2.3 Corruption

As noted in the Indian scenario in Chapter 2, water flow does not simply follow the gravity; instead its path is mediated by money and politics (Koner and Samanta, 2021). Access to water is dependent on the amount of power one holds. This means that different people and institutions could dictate the direction of the flow of water.

In Ipelegeng Township, whenever the temporary water sources are filled up, the community is prejudiced through corrupt allocation of this precious resource. Water flow follows political and financial muscles, which helps explain the skewed distribution of and differential access to water. In

Ipelegeng Township, access to water is dependent on the power that an individual wields within the community, hence the elite benefits more at the expense of the majority. Therefore, where water is available, asymmetric power determines distribution thereby, paving way for illegal water tapping. This is reflected in the four houses that illegally tapped into the community water tanks. There are also allegations against the awarding of the tender to the current service provider.

Ipelegeng community, their ward councillor and community leader all agree that corrupt activities within the municipality have affected their water supply. Like in the Indian city of Darjeeling, corruption within the water system, affects free flow of water to intended consumers. Well- resourced tourism players in Darjeeling, such as hotels are at the forefront of greasing corruption as they try to provide water for their guests, instead of sinking boreholes to help alleviate water problems in the city (Koner and Samanta, 2021).

5.2.4 Illegal connections

Illegal water connections are common in areas that are poorly serviced. In some of the case studies in chapter 2, illegal connections are common in India (Koner and Samanta, 2021) and Kenya (Gedo and Morshed, 2013), especially in poor neighborhoods of the two countries. Such activities deprive others of water, because the flow has been diverted, and the pressure reduced for others. Whenever there is an illegal connection, the perpetrators resale the stolen water to the same community.

5.2.5 Voiceless community committee

Common voice of a community resides in a committee that not only speaks on behalf of the community, but also provides guidance and direction on commonly shared resources such as water (Moore and Carpiano, 2020; Bisung et al., 2014). Ideally, such a community committee is empowered to manage and maintain communal resources. The ability of a community to cooperate for the common good is the hallmark of social capital and social access. In South Africa, community committees are supposed to liaise between the residents and the municipality (SAHRC, 2018; Reddy, 2016). However, in Ipelegeng Township, the community committee seems to have been reduced to handing ultimatums and mobilising for protests.

While participants spoke about a community committee, however, the functions of such a committee were not clear, or people were not aware of its purpose. One important functions of the committee is governance of water resources that leads to sustainable resource management (Bisung et al., 2014). On the part of officials, they seem content with the status quo, directly or indirectly contributing to the water crisis. The powerlessness of the community committee often creates mistrust between the

committee members and rest of the community who might think that their representatives could be benefitting from the crisis.

From the social capital perspective, one anticipates that strong community governance of water resources would result in sustainable resource management. Lack of trust between the community and the municipality and inadequate communication from the latter threaten the sustainability of any water supply to the community, especially through temporary measures. While social capital and social access provide for cooperation among stakeholders in allocating services and sharing of ideas (Parlee et al., 2021; Treue and Nathan, 2007) , in Ipelegeng Township, the stakeholders seem to be working against one another, no one knows what the other is doing.

In the Benin case study, community committees play a major role in the management of water infrastructure (Comair et al., 2021; Aime et al., 2022). The committees, which are a mixture of youth and adults, have been trained to manage and maintain the infrastructure. The community at large contributes a monthly fee into a fund that would be used to purchase spare parts and the maintenance of the communal water sources (Comair et al., 2021; Aime et al., 2022). The community committees in Benin have a voice that is audible unlike in Ipelegeng Township, where the committee has been reduced to mere spectators of the water crisis. This is despite that the South African constitution stipulates that a municipality cannot do anything without the involvement of the community (SAHRC, 2018).

5.2.6 Communication

The mistrust mentioned above, is created from lack of communication between municipal officials and the community on one hand; and limited or no communication between the ward councilor and the residents. Success of social capital and social access is based on adequate information from institutions such as the municipality to the people.

In most cases officials make unreasonable promises, which they fail to keep, forcing affected people to vent their frustrations on public property through violent protests. These protests end up harming the community, because in their anger they indiscriminately destroy public property, which they use such as water tanks.

5.2.7 Pre- and post-apartheid administrations

In most African countries that were previously colonised, citizens out of frustration yearn for years of repression, which they say were better than the democratic dispensation. This is largely induced by

stagnant development, where governments are failing to provide basic services such as water. Most of these countries experienced a population boom and rapid rural-urban migration that stretched infrastructure meant only for a few people. Incoming administrations were either slow or neglected to expand existing infrastructure such as water and sanitation and electricity, which has triggered water crises across most African countries and power outages respectively. This is the reason why some respondents in Ipelegeng Township said that days under apartheid were better than the post-repression regime, because they had access to water in their homes.

While the government claimed to be doing their best to address the water crisis, the reality on the ground is different. The claims by the three government officials are the same claims made in a 2016 media statement (SA Government, 2016); which meant that seven years after that statement was issued the three arms of government are still working on a permanent solution to the water crisis in Ipelegeng.

5.3 ROLE OF STAKEHOLDERS IN THE IPELEGENG TOWNSHIP WATER CRISIS

The water supply scenario in Ipelegeng falls far short of the recommendation of the South African Water Service Act 108, 1997, that stipulates people should receive sufficient water every day. The residents complained that at times there is no water in the community for days, which prompts them to protest. The situation in the study area also lags behind calls by the United Nations to increase investment in water infrastructure, the management of water sources and sanitation facilities at the local level.

The local authority acknowledges that there is a water crisis which has been mismanaged. The municipality is responsible for awarding the tender for a water supplier. Evidence is there that a previous service provider from 2009 – 2012 was able to maintain a constant supply of water to the township. However, the situation changed when the municipality engaged a new service provider from 2012. Water supplies became erratic with residents spending days without water. During the 10 days stay in the township for field work, the researcher only witnessed three occasions where some of the water tanks were filled in different sections. Instead of sharing responsibility for the failure of the tinkering system, the district and provincial officials blames the service provider, whom they approved.

According to evidence gathered, prior to 1994, the community had running water some in their households, while others used communal taps and also from 2009 – 2012. Like the Cape Town scenario mentioned in section 1.0 of Chapter 1, there is no proactive management in the Mamusa

municipality geared towards investing in water infrastructure for Ipelegeng Township. Because evidence exists that in the past household with taps used to produce water, except probably for houses in Extension 6, who were never connected the water network. Since the start of the water crisis in 2013, officials from the municipality, district and provincial offices have been talking about working on a permanent solution, which is not visible on the ground.

On the part of the residents of Ipelegeng Township, there is clear lack of community governance of water sources, including temporary ones. The community seems to only come together in venting their anger at the water tanks, but doing little to help with guarding and maintain existing water infrastructure. Social access theory advocates for community based management of resources such as water (Parlee et al., 2021; Treue and Nathan, 2007), which is absent in Ipelegeng. The community members have failed to police each other against vandalising existing water infrastructure such as the Jojo tanks. Instead in their frustrations the community targets the tanks during service delivery protests while illegal water tapping continues unabated.

The municipality made a deliberate decision to change a service provider who was actually providing a service which is not different from deliberate government water policies in China and India that are biased against rural areas. While the water policies in China and India favours industrialisation and urbanization (Liu et al., 2019; Hao, 2014; Lin, 2014) in Ipelegeng the change in the service provider was not done with the residents in mind, but was probably an opportunity for some within the municipality to financially benefit directly and indirectly from the new service provider.

Villagers in China, though aware of their water crisis, have adopted a rather docile attitude probably out of fear of the repressive nature of the government (Hao, 2014; Lin, 2014). They have resorted to bottled water, digging their own wells or migrating to better water resourced areas. However, in few instances where villagers publicly displayed their displeasure, polluting companies in China have responded by constructing water treatment facilities (Hao, 2014; Lin, 2014).

5.4 SOLUTIONS TO THE WATER CRISIS IN IPELEGENG TOWNSHIP

The solution to water crisis is investing in water supply infrastructure and water management. Before the current international development agenda guided by the Sustainable Development Goals, national governments had previously crafted their own timed water development goals, such as water for all by year 2000, that have been missed. Among the SDGs whose timeline is 2030 is Goal 6 on clean water and sanitation, with eight targets. With about less than eight years left to the SDGs timeline of 2030, most countries including South Africa are likely to miss most of the targets of SDG

6, mainly because of low investment in water infrastructure, climate change, and others would blame COVID-19. Plans are there to improve access to water, but no funding to implement those plans, which means governments from national to local authorities have to do more with the little water that is available.

In Ipelegeng Township, the municipality has plans to refurbish the Wentzel Dam water treatment plant and revive water flow to the township. While the plan is in the long term, in the interim, there are plans to increase water trucks and tanks. However, with the existing service provider, the issue is not about the number of water tanks but the frequency of filling the tanks that needs to be addressed. The municipality need to renegotiate its agreement with the service provider so that it is performance based, with the community providing an appraisal. The tanks have sufficient capacity to cater for all, only if the service provider adheres to stipulated times of filling them. The service provider should not only supply water, but together with the municipality train the community in water infrastructure maintenance.

The municipality could also repair existing boreholes in the community and drill more. As already indicated some of the driest parts of Africa have a 'sea' of underground water, which could be handy for the Ipelegeng community. Depending on the pressure and flow of water from the boreholes, these could be connected to the existing water system that flows into different households. In Vhembe District Municipality, Limpopo, officials are trying to identify underground water sources for Mtititi community (Chiguvare, 2022). Through boreholes, Benin has become a role model of water provision for rural areas. The water programme in Benin has capacitated the beneficiaries with management and maintenance training (Comair et al., 2021; Aime et al., 2022).

In order to cater for future expansion, the municipality needs to expand the existing bulk water reservoir. The municipality could also embark on water augmentation scheme for the Wentzel Dam. This entails transferring water from other dams or water source into Wentzel. There is Barberspan Dam in Delaryville, about 70km from Wentzel; Johan Nesor Dam in Klerksdorp, 162km away; and Taung Dam, in Taung, 80km from Wentzel. The process would ensure that the dam has a constant supply.

Surrounding commercial farms that have dams could also provide relief to the municipality. The farms utilise labour from the township, therefore, the farmers have an obligation to provide water to the community. Besides the farms, there are some gold mines who also tap into the community labour market.

The success of these programmes hinge on the political will of the local authority. The political will exhibited by the Benin government has turned universal access to water from only constructing water sources, but has professionalised the management of the water supply system (Comair et al., 2021; Aime et al., 2022), a lesson that can be learnt by the Mamusa Municipality, which is responsible for providing Ipelegeng Township with water. The Ipelegeng community needs not only permanent source of water but an efficient water system that would remove the added burden of searching for water from women and girls.

5.5 SUMMARY

This chapter provided a critical discussion of the findings in relation to the literature review and theoretical framework. Evidence proves that the water crisis in Ipelegeng Township is wholly man-made and can be fixed through investing more in water infrastructure and water management skills from the bottom to the top. The next chapter concludes the research and also provides recommendations and points to areas for further study.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.0 INTRODUCTION

This final chapter provides conclusion to the study – answers the research question, the research process and offers recommendations; and points to areas for further study.

6.1 CONCLUSION

This study sought to explore the nature of water crisis in Ipelegeng Township, in the North West Province, South Africa. Given the nature of water related problems faced not only in South Africa, but in other developing countries as well, there is a need to investigate ways in which solutions can be found. The water crisis in Ipelegeng Township is man-made exhibiting both the physical and economic elements of water scarcity. Both the community and government officials at the three levels of government have contributed to the water crisis; and both have the capacity to provide solutions to end the problem. However, it requires political will on the part of the three tiers of government; and the community harnessing their relationships towards the sustainable management of their water sources and infrastructure.

The research process adopted for this study mostly qualitative was adequate. The flexibility of the approach was crucial in the process. The researcher was able to add observation to the data gathering methods, this after driving around the study area. The result was captivating photographs that depict the daily water sufferings that the people in Ipelegeng go through daily.

The theoretical framework from the literature review and case studies helped anchor and guide the rest of the research process. The researcher was able to relate the research findings to the document analysis done.

During the field work, while three sections of the township pulled out; nine households refused to participate in the study and four participants withdrew during the process, however this did not affect the research findings. The only limitation to the study was time and funding which forced the researcher to focus on a small research sample of 20 residents from a population of plus 42, 000.

The study will contribute to the knowledge data base of water problems in South Africa, but more specifically to Ipelegeng Township. The province, district and municipality can draw lessons from

some of the novel ideas in the case studies presented in this study to address the water crisis not only in Ipelegeng, but in other parts of the province. While the community can draw lessons on how to utilise their social capital for economic development instead of destruction.

6.2 RECOMMENDATIONS

For Ipelegeng Township to attain SDG 6, requires the combined efforts of the civil society, the private sector and the community. The government on its own cannot provide access to water for all. They have tried, but because water provision is a mammoth task, they have failed. The government needs partnerships; and the Benin government has shown the benefits that come from effective partnerships with the private sector, international non-governmental organisations, civil society and the people. Some of the solutions to the water crisis that include water augmentation requires huge investments, which is where partnerships comes in. Improving the water supply system for Ipelegeng Township should have ripple effect on other surrounding areas through an inter-city/town water resource network and inversely water development in other towns/cities should also benefit Ipelegeng Township through similar resource network. The province through the national government should start recycling waste water; which proved to be a viable source of water from countries.

The municipality should introduce performance based work for service providers with the community being serviced providing an appraisal before any payment is made. This means that the community through its committee should sit in the tender awarding committee. By involving the community committee in the pre- and post- tendering process, is one way of empowering the community and opening communication lines.

The community committee should take an active part in the affairs of the community instead of leaving everything to the municipality. Addressing the water crisis in Ipelegeng Township requires a multi-sectorial approach that includes local government, the community, civil society, farmers and mining companies around the area. Because water supply is critical for life and development therefore, it should not be an exclusive preserve of the municipality. People's right to active participation in development is enshrined in the Municipal Systems Act (2000) and the Municipal Structures Act (1998) that stipulates that community participation forums and community based planning should form an integral part of the Integrated Development Planning process. It is through IDP that people are given an opportunity to identify, prioritise their needs and participate in the development, implementation, monitoring and evaluation of the development plans that include water provision. Therefore, the community committee should be held responsible for the development of

Ipelegeng or lack of it; and guarding the community's property, especially during protests. The committee should also be responsible for reporting and fixing water leaks.

Once the above process has been completed then there would be need to increase the water tanks and trucks. Since the water supply is now performance based, the service provider has to provide a supply scheduled monitored by the community committee. Besides increasing the water trucks and tanks, the municipality could also repair all boreholes that are not working and sink more. The community committee should help identify people in all sections for training in maintenance, servicing and repairing of the water equipment. If boreholes became a permanent feature of water supply in the area, then a token fee could be introduced towards their maintenance. Once people start paying towards the maintenance of the water facilities, it creates a sense of ownership and the community would jealously, guard these sources.

The municipality should engage commercial farmers around the area and mining companies to not only help fund some of the work but provide water to a community that serves as their labour pool. The farmers and the mines could also help fund the refurbishment of the water treatment plant.

The community should be educated about the importance of conserving water. Such campaigns should start from the schools into the different sections. Some of the community committee members should form part of the team that conducts such awareness campaigns.

6.3 FURTHER STUDY

Further study, is needed into the role of community in managing resources such water sources both temporary and permanent. While the Integrated Development Planning processes encourage active participation of communities, is it lip-service? Because given the service delivery protests in South Africa, one wonders on the effectiveness of community participation in IDP. Another focus of research could be around the impact of the water crisis in Ipelegeng Township on sanitation.

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ANNEXURE 1 QUESTIONNAIRE

Community Members Questionnaire Tool

Semi structured Interviews questions.

My name is Thabo Sonnyboy Tlou, am currently doing my Masters in Development Studies at North West University Mafikeng Campus. As part of my studies, I am conducting a research, "Exploring the nature of the water crisis in Ipelegeng Township, South Africa." Therefore, I would like you to take part in the interview. Your identity will remain anonymous. Please note that taking part in this research is voluntary and you allowed to quit at any time you want to.

Biographical Information of Respondents

Instructions

- Please mark with an X your preferred answer in the block provided.

Questions

Age between:

a. 18-25	
b. 26-35	
c. 36+	

Gender

a. Male	
b. Female	
c. Others	

Educational level

a. No Education	
b. Grade 1-7	
c. Grade 8-12	
d. Matric	
e. Tertiary	
f. Post Graduate	

Type of Income

a. Salary	
b. Pension Grant	
c. Others	

What is your source of water?

a. Bore hole	
b. River	
c. Lake pipe	
d. Mobile water tanks	

ANNEXURE 2

INTERVIEW SCHEDULE FOR COMMUNITY MEMBERS

- **What are the possible causes of water crisis experienced in Ipelegeng Township?**
 - i) How is the water situation in Ipelegeng Township for domestic use?
 - ii) How did the water problem in the township start?
 - iii) For how long has the township experienced, this water problem?
 - iv) What are you using for cooking, bathing, and vegetable garden if you have any?
 - v) What are the authorities saying regarding this problem?
 - vi) What do you think, needs to be done to resolve this water problem?
 - vii) And what role do you think you as the community should in resolving and improving the water situation?

- **What are the roles of stakeholders in the current water problem in Ipelegeng?**
 - i) What measures have been taken by the stakeholders regarding the water problem?
 - ii) Are the measures working regarding the problem?
 - iii) How do you manager the water problem?
 - iv) What is the level engagement between the municipality and community in terms of finding solutions to the water problems and empowering the community to manage water resources?

- **What are the possible solutions to water scarcity in Ipelegeng Township?**
 - i) What do you think should be done to address the water situation?
 - ii) What is the municipality doing to solve the water problem?
 - iii) Do you think the water tank program works for the community?
 - iv) Do you think the water supply problem in the municipality can be solved in the long run?
 - v) What better solution would work for the community regarding the water problem?
 - vi) What role can the community play, to ensure sustainable water supplies to the area?

ANNEXURE 3

INTERVIEW SCHEDULE FOR MUNICIPAL OFFICIALS/WARD COUNCILLOR/COMMUNITY LEADER

1. What are the possible causes of water crisis experienced in Ipelegeng Township?

- i) Residents in Ipelegeng are complaining about their water situation. What seems to be the problem?
- ii) What is the municipality doing to address water shortage in Ipelegeng and ensure that the community is supplied with water according to the country's legal requirements?
- iii) Where have you been getting water from since the beginning of the Water problem or what is the source of your water supply?

2. What are the roles of stakeholders in the current water problem in Ipelegeng?

- i) What measures have been taken by the municipality regarding the problem?
- ii) What is the level of engagement between the municipality and community in terms of finding solutions to the water problems and empowering the community to manage water resources?

3. What are the possible solutions to water scarcity in Ipelegeng Township?

- i) What is the municipality doing to solve the water problem?
- ii) What do you think should be done to address the water situation?
- iii) Do you think the water tank program works for the community?
- iv) The current temporary water measures, are they adequate and do they meet legislative requirements in terms of individual and household access to water?
- v) Any chance of a permanent solution to the water problem in Ipelegeng Township?


ANNEXURE 4 INFORMED CONSENT



Building F13, Room 116
Basic and Social Sciences Research Ethics Committee (BaSS
REC)

21081719@nwu.ac.za

DATE:.....

<p>BaSSREC Authorization</p> <p>Rothmann  Jacques Rothmann Date: 2021.11.04</p> <p>Approved 4 November 20</p>

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

Title of the research project	Exploring the nature of water crisis in Ipelegeng Township, South Africa.
Ethics number	NWU-01105-21-A7
Principal investigator	Thabo Tlou
Student number	26578565
Address	3347 Ledig
Email address	Thabotlou17@gmail.com
Contact number	0782302730

You are being invited to take part in a research project that forms part of my studies. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research is about and how you could be involved. Also, your

participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part. Prior to publication of the study's results (or the point that publication is in process), you may also withdraw the data you generate.

This study has been approved by the **Basic Social Sciences Research Ethics Committee (BaSSREC) of the Faculty of Humanities of the North-West University (NWU-01105-21-A7)** and will be conducted according to the ethical guidelines and principles of the international Singapore Statement on Research Integrity (2010) and the ethical guidelines of the National Health Research Ethics Council. It might be necessary for the research ethics committee members or relevant authorities to inspect the research records to make sure that we (the researchers) are conducting research in an ethical manner.

What is this research study all about?

- This study seeks to explore the nature of the water crisis in Ipelegeng Township, South Africa. Households have indoor water taps, but these are dry. Selection of participating households will be done using random sampling method – a lottery-like method. Data collection will be through the use of a combination of structured and unstructured interviews technique to allow for in-depth probing of the respondents.
- The researcher has been trained to use the methods mentioned in the previous sentence.
- Approximately 20 participants will be included in this study.
- *The objectives of this research are:*
 - Investigate possible causes of water crisis experienced in Ipelegeng Township.
 - Explore the role of stakeholders in the current water crisis in Ipelegeng Township.
 - Examine possible solutions to the water crisis in Ipelegeng Township.

Why have you been invited to participate?

- You have been invited to participate because you are part of the people that are being affected by the water crisis in Ipelegeng Township, South Africa.
- You have also complied with the following inclusion criteria: You are 18 years and older; and has lived in the area for more than ten years. You will be invited to answer a set of questions that would include possible follow-ups. Each interview will be conducted behind closed doors and is expected to last one hour. After each interview participants would be alerted of possible follow-ups for further clarity on issues that could have been raised. Because in qualitative research there is a back and forth process until all possible gaps are filled.
- You will be excluded if you are younger than the participating age and not lived in the area for more than ten years.

What will your responsibilities be?

- You will have 3 days to indicate whether you would be willing to participate.
- You will be requested to sign the Informed Consent Statement before the commencement of the

study.

- You will be requested to ask the researcher any questions for clarity purposes.
- You will be requested to answer questions about the study.

Will you benefit from taking part in this research?

- The direct benefits for you as a participant will probably be contributing towards possibly water solutions for the area.
- The indirect benefit will probably be contributing to the enactment of public policy on water management.
- Are there risks involved in your taking part in this research and how will these be managed?

The possible risks in this study, and how these will be managed, are summarised in the table below:

Possible risk	Mitigation strategy
COVID 19 risk during face-to-face interviews.	Strict adherence to COVID-19 guidelines that include wearing of face masks throughout, social distancing and regular hand sanitizing
Emotional distress of the participants.	Counselling may be scheduled for the distressed of participants.
Tiredness and discomfort.	Comfort breaks of 5 minutes provided may be to the participants.
Lack of privacy and comfort during interviews due to lack of security.	<ul style="list-style-type: none"> • For privacy and confidentiality one-on-one interviews would be conducted behind closed doors either at a neutral venue, such as the council boardroom or at participants' own residences. • Identities of participants will be kept secret, i.e. anonymity will be ensured throughout the study.

<p>Detail the requirements of subjects to participate in this research. Specify what they are expected to do, how long their involvement will take and whether the study will require multiple or follow-up activities.</p>	<ul style="list-style-type: none"> • Participation in the study is open to anyone who meets the following criteria: each participant should be 18 years and older; should have lived in the area for more than ten years. • Each participant is requested to answer a set of questions that would include possible follow-ups. • Each interview will be conducted behind closed doors and is expected to last one hour. After each interview participants would be alerted of possible follow-ups for further clarity on issues that could have been raised. • Because in qualitative research there is a back and forth process until all possible gaps are filled.
---	--

- *However, we do believe that the benefits to you and to science (as noted in the previous section) outweigh the risks we have listed. If you disagree, then please feel free not to participate in this study. We will respect your decision.*
- *Should we learn, in the course of the research, that someone is harming you, or that you are intending to harm someone, then we must tell someone who can help you/warn the person you are intending to harm.*

Who will have access to the data?

- The handling, storage, security and analysis of data is critical in ethical considerations. I will ensure data in both hard-(printed) and soft copy (electronic) are safely locked away and password-protected, respectively. Only approved people in my research team may have access to my raw data where the need arises. At the analysis stage, as will be the case throughout, the use of coding will reinforce participants' non-identification, hence upholding the assurance of confidentiality and anonymity.
- *Anonymity* will be ensured by choosing your own fictitious names before the interview starts. Only this name will be used in the research process.
- *Confidentiality* will include the use of pseudonyms for participants, organisations and locations. It involves not disclosing any information gained from an interviewee deliberately or accidentally in ways that might identify an individual.
- *Privacy* will be ensured by not probing unnecessarily if you do not wish to discuss particular matters.
- I will not use a transcriber for the purpose of the transcripts after the interview. I will be responsible for transcribing the data – no other person will have access to the data.
- I will not use an interpreter for the purpose of the interviews/explaining the informed consent, etc. This person will be required to sign a NWU Confidentiality Agreement and will not be permitted to share any information relating to the study with anyone else.
- The data will be stored safely in electronic form for a period of five years after which it will be destroyed.

What will happen to the data?

The data from this study will be reported in the following ways: thematic analysis is the preferred method for this study. During data analysis, the researcher should be able to go back and forth to fill any gaps identified. In all of this reporting, you will not be personally identified. This means that the reporting will not include your name or details that will help others to know that you participated. The actual name and any other identifiable information about the participants will be anonymised through assigning a pseudonym to each of them. The ward councillor and community leader will be requested to either select their own pseudonyms or consent to the use of their actual names or designations for the purpose of the reporting.

Data may be re-used in the form of research to another study.

Will you be paid/compensated to take part in this study and are there any costs involved?

No, you will not be compensated to take part in the study. There will thus be no costs involved.

How will you know about the findings?

The general findings of the research will be shared with the participants at a community meeting, which the council or councillor hosts. The municipality will receive a copy of the completed Dissertation/Thesis.

Is there anything else that you should know or do?

- You can contact Thabo Tlou (researcher) at 0782302730 (cell phone number) and Thabotlou 17@gmail.com (email address) if you have any further queries or encounter any problems.
- You can contact the chair of the Basic Social Sciences Research Ethics Committee (Prof Jacques Rothmann) at 0182991595 or 21081719@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the researcher.
- You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I _____ agree to take part in a research study entitled: "Exploring the nature of water crisis in Ipelegeng Township, South Africa."

I declare that:

- I have read and understood this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions to both the person obtaining consent, as well as the

researcher (if this is a different person), and all my questions have been adequately answered.

- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I understand that what I contribute (what I report/say/write/draw/produce visually) could be reproduced publically and/or quoted, but without reference to my personal identity.
- I consent to an audio-visual recording of the interview (study).
- I am aware of the fact that I may request that the researcher does not continue with said recording if I request it.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.

Signed at (place) _____ on (date) _____ 20 _____

Signature of participant Signature of witness

- You may contact me again
- I would like a summary of the findings of this research
- I would like feedback on my functioning/wellbeing as reflected in the questionnaires I completed

<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No

The best way to reach me is:

Name & Surname: _____
Postal Address: _____
Email: _____
Phone Number: _____
Cell Phone Number: _____

In case the above details change, please contact the following person who knows me well and who does not live with me and who will help you to contact me:

Name & Surname: _____

Phone/ Cell Phone Number /Email: _____

Declaration by person obtaining consent (if not the researcher)

I (name) _____ declare that:

- I explained the information in this document to _____
- I encouraged him/herself to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (place) _____ on (date) _____ 20 _____

Signature of person obtaining consent Signature of witness

Declaration by researcher

I (name) _____ declare that:

- I explained the information in this document to _____
- I encouraged him/herself to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (place) _____ on (date) _____ 20 _____

Signature of researcher

Signature of witness

Declaration by researcher and participant

Personal face-to-face interviews during Covid-19 restrictions

Additional declaration by participant in those instances where the participant requests to participate in a person

al face-to-face semi-structured interview:

By signing below, I _____, acknowledge the following information related to the required measures regarding Covid-19:

I declare that:

- It is my personal choice and preference to participate in a personal face-to-face semi-structured interview with the researcher.
- This requires that I consent to the following strict measures to safeguard the personal health and safety of myself and that of the researcher/interviewer/primary investigator:
 - I consent to the researcher taking my temperature before the interview using a thermometer. **Yes**
No
 - I confirm that my temperature measured at _____ degrees. **Yes** **No**
 - I consent to use the three-ply mask provided by the researcher. **Yes** **No**
 - I consent to wear the three-ply mask for the full duration of the interview.

Yes No

- I consent to the researcher sanitising the interview context using a sanitiser with an 80% alcohol content before the commencement of the interview. **Yes** **No**
- I consent to the researcher using a sanitiser with an 80% alcohol content before and during the interview if required. **Yes** **No**

Signed at (place) _____ on (date) _____ 20 ____

SIGNATURE OF PARTICIPANT

SIGNATURE OF RESEARCHER

ANNEXURE 5 ETHICS APPROVAL LETTER



Private Bag X1290,
PotchefstroomSouthAfric
a 2520

Tel: 018299-1111/2222

Fax: 018299-4910

Web: <http://www.nwu.ac.za>

SenateCommitteeforResearchEthics

Tel: 018299-4849

Email:nkosinathi.machine@nwu.ac.za

4November2021

ETHICSAPPROVALLETTEROFSTUDY

Basedonapprovalby the**BasicandSocialSciences ResearchEthics Committee (BaSSREC)**on04/11/2021, the Basic and Social Sciences Research Ethics Committee hereby **approves** your study asindicated below.This implies that the North-West University Senate Committee for Research Ethics (NWU-SERC) grants its permission that, provided the special conditions specified below are met and pending anyotherauthorisationthat maybenecessary,thestudymaybeinitiated,usingthe ethics numberbelow.

Studytitle:ExploringthenatureofwatercrisisinIpelegengTownship,SouthAfrica

.Supervisor:Dr.S.Tanyanyiwa.

Ethicsnumbe

Institutio StudyNumbe Yea Statu
Status:S=Submission;R=Re-Submission;P=ProvisionalAuthorisation;A
=Authorisation

ApplicationType:Single Study

N W U - 0 1 1 0 5 - 2 1 - A 7

Commencementdate:04/11/2021

Risk:

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, the following general terms and conditions will apply:

- The study leader/supervisor (principal investigator)/researcher must report in the prescribed format to the BaSSREC:
 - annually (or as otherwise requested) on the monitoring of the study, whereby a letter of continuation will be provided, and upon completion of the study; and
 - without any delay in case of any adverse event or incident (or any matter that interrupts sound ethical principles) during the course of the study.
- The approval applies strictly to the proposal as stipulated in the application form. Should any amendment to the proposal be deemed necessary during the course of the study, the study leader/researcher must apply for approval of these amendments at the BaSSREC, prior to implementation. Should there be any deviations from the study proposal without the necessary approval of such amendments, the ethics approval is immediately and automatically forfeited.
- Annually a number of studies may be randomly selected for an external audit.
- The date of approval indicates the first date that the study may be started.
- In the interest of ethical responsibility, the NWU-SCRE and BaSSREC reserve the right to:
 - request access to any information or data at any time during the course or after completion of the study;

Special in process conditions of the research for approval (if applicable):

- to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process;
- withdraw or postpone approval if:
 - any unethical principles or practices of the study are revealed or suspected;
 - it becomes apparent that any relevant information was withheld from the BaSSREC or that information has been false or misrepresented;
 - submission of the annual (or otherwise stipulated) monitoring report, the required amendments, or reporting of adverse events or incidents was not done in a timely manner and accurately; and /or
 - new institutional rules, national legislation or international conventions deem it necessary.
- *BaSSREC can be contacted for further information or any report templates via 21081719@nwu.ac.za / 13128388@nwu.ac.za.*

The BaSSREC would like to remain at your service as scientist and researcher and wishes you well with your study. Please do not hesitate to contact the BaSSREC or the NWU-SCRE for any further enquiries or requests for assistance.



Your sincerely

Prof Jacques Rothmann

Chairperson NWU Basic and Social Sciences Research Ethics Committee

Original details: (22351930)

C:\Users\22351930\Desktop\ETHICS APPROVAL

LETTER OF STUDY.docm 8 November 2018

File reference: 9.1.5.4.2