

**Perceptions of community members in Lephalale area,
Limpopo province, towards water conservation: Towards
the development of a psychological model**

BY

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DECLARATION

I declare that the thesis titled, **Perceptions of community members in Lephalale area, Limpopo Province, towards water conservation: Towards the development of a psychological model**, hereby submitted to the University of Limpopo for the degree of Doctor of Philosophy in Psychology, has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

.....

Seretlo-Rangata ML (Ms)

.....

Date

DEDICATION

This thesis is dedicated to my family; my husband Matome Rangata and my children, Khumo and Atang. I am deeply grateful for their overwhelming support throughout my journey. This dedication extends to the Seretlo family, *Bahlaloga, magadimana ntweng!* We did it!

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ABSTRACT

Despite interventions by various governments to regulate water demand and address water scarcity, literature shows that billions of people across the world continue to struggle with access because not everyone contributes equally to conservation efforts. Behavioural factors such as individual and collective aspects of cognition and commitment have been found to play an important role in water conservation. The present study aimed to explore the perceptions of community members in the Lephalale area, Limpopo province, towards water conservation to develop an explanatory psychological model of water conservation. Twenty (20) participants who relied on communal taps to access water in Lephalale Local Municipality, Limpopo province were selected through purposeful sampling. In-depth, semi-structured, individual face-to-face interviews were used to gather data and were analysed utilizing Thematic Content Analysis (TCA). The following themes were extracted from the participants' narratives: meanings attached to water, psychological effects of water scarcity, coping strategies to handle the issue of water scarcity, participants' experiences of water conservation, behaviours that hinder water conservation, and behaviours that promote water conservation.

The study findings showed that people have attached symbolic and significance-based meanings to water which affects their water consumption behaviours. The research findings also revealed that there are various psychological effects of water scarcity on communities such as emotional distress, interpersonal conflicts, and disruptions of daily activities of living. Additionally, the study results showed that the coping strategies developed by participants to deal with water scarcity included adopting alternative water use behaviours as well as adjusting current behaviours and lifestyles. Various behaviours that hinder as well as those that promote water conservation were identified by study participants.

Derived from the study findings, a psychological model of water conservation was developed. The model incorporates some ideas from the Value-Belief-Norm (VBN) theory and the Afrocentric theory. The model suggests that people's worldviews, including their values, beliefs, and culture are significant determinants of their pro-environmental behaviours. For instance, it was found that peoples' perceptions, views

as well as meanings they attach to water affected their water consumption behaviours. The study recommends that authorities and policy-makers should consider psychological factors when developing water management programmes, strategies, and interventions. The study further recommends that psychology experts need to be included and consulted when such programmes are developed.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter introduces the present study. The background to the study and research problem outlined, highlighting the contextual challenges that gave rise to the present study. Furthermore, the purpose and significance of the study is outlined. Lastly, the chapter will give an overview of how the thesis is organised.

1.2 Background to the study

Water scarcity is one of the world's greatest challenges affecting the well-being of communities. According to Fan, Wang, Liu, Yang, and Qin (2014), about 1.2 billion people worldwide live in areas with a shortage of water. This suggests that governments and authorities at every level worldwide must develop and implement plans for executing the political, economic, and technological measures that can ensure water security now, and in the future (Fan et al, 2014; Rogers, 2008). In Africa, many countries are trying to deal with the water scarcity crisis through initiatives such as Africa Water Vision 2025 (Wright, Donkor, Yahaya & Woudeneh, 2005). This initiative was intended to, amongst others, address water usage and scarcity problems, and to ensure that there is a shift in methods that promote fairness and maintainable use and management of the water resources of the African continent. This is also to assist with the alleviation of poverty, socio-economic development, regional cooperation, and the safe-guarding of the environment. Certain milestones and possible actions such as investments and specific tools are identified by the Africa Water Vision 2025 as necessary to achieve the desired vision (Wright et al, 2005).

The recognition of South Africa's risky water supply and scarcity also led to various advanced initiatives to address this challenge at national and local levels (Nel, Reyers, Roux, & Cowling, 2009). South Africa is one of Africa's water-scarce countries, thus, making water quality and its use more profitable an important national priority (Donnenfeld, Crookes & Hedden, 2018; World Cup Legacy Report, 2011). As one of the key South African national initiatives to address water scarcity, the Department of Water Affairs and Forestry introduced the Water Conservation and Water Demand Management Strategy (WC/WDM) in 2004 (Department of Water Affairs and Forestry

[DWAF], 2004a). Another key objective of the national strategy is to promote water-use efficiency by emphasising effective management of water resources and sensitising all consumers and water institutions about their duty to implement adequate measures to contribute to water-use efficiency.

Lephalale municipality, which is also generally a water-scarce area situated in the Waterberg District (Limpopo Province) has encountered incidences of water shortages. In some instances, the municipality had to provide tankers and boreholes to ensure that all households have water at least within 200m of each dwelling. Despite these efforts, there are still many challenges of water shortages as the town grows at a rapid pace and informal settlements mushroom around town (Lephalale Local Municipality Annual Report, 2016-2017). Similarly, the recent water shortage crisis in Cape Town has prompted the city to actively implement water restrictions at different levels with the main aim being to reduce water usage (Muller, 2017). Muller (2017) further reported that in Cape Town restrictions such as limiting watering of gardens, sports fields, and parks to only twice a week, using a bucket or watering can, were implemented. Punitive measures such as fines were imposed on those who transgress these restrictions.

The scarcity of water affects everyone in both local communities and globally. However, despite various interventions and policy declarations such as Africa Water Vision 2025, not everyone is equally committed to conservation efforts (Tal, Hill, Figueredo, Frías-Armenta & Corral-Verdugo, 2006). Hence, Anderson, Romani, Phillips, Wentzel, and Tlabela (2007) suggest that another manner to address this challenge is to increase public awareness regarding the causes of pollution of water, air, and ground, thus improving good environmental responsibility by both individuals and communities. Coetzee, Nell, and Bezuidenhout (2016) add that to address issues such as water supply and conservation, it is crucial to understand the views, sources, and uses of water that are dominant in less advantaged areas.

1.3 Research problem

According to DWAF (2004b), water is essential for human life, hence the priority is to make certain that the management of water resources ensures that water services are provided to all people (DWAF, 2004b). Various regulations such as the National Water

Act (36 of 1998) were adopted to regulate, amongst others: a). the use of water; b). development of water management strategies; and, c). policies and protection of water resources. Unfortunately, regardless of the national policies and interventions set to regulate water demand and address water scarcity, water conservation remains a major problem in South Africa. Hurlimann, Dolnicar, and Meyer (2009) note that the lack of commitment by both the consumers and local authorities is often one of the main hurdles in the implementation of many policies and interventions to address water scarcity.

DWAF (2004a) further notes that the water services sector experiences challenges in the implementation of the WC/WDM strategy because of the unpreparedness of the public to embrace different water behaviours and water conservation promotion initiatives. This is because policy-making related to sustainable development and conservation of water is usually a matter that is addressed globally and nationally, whilst the utilisation it aims to alter occurs at the household level. This implies that the community plays a key role in the sustainable development and promotion of pro-environmental behaviour (de Miranda Coelho, Gouveiab, de Souzac, Milfontd and Barrosa, 2015; Koehler, 2018). The statements above suggest that due to a lack of collaboration amongst policy developers and water consumers at the household or community level, available regulations and interventions are not efficient to promote water conservation.

Jacobs-Mata et al. (2018) add that these interventions and strategies have a slight effect on the change in water consumption attitudes, perceptions, and behaviours of communities. Corral-Verdugo, Frías-Armenta, Tapia-Fonllem, and Fraijo-Sing (2012) suggest that to effectively face problems of conservation and water demand, it is essential to explore the behavioural and social causes of water usage. This suggestion was echoed by de Miranda Coelho et al. (2015), who points out that the misuse of water, like many other environmental problems, is often a result of maladaptive human behaviours. Hence, it is important to understand the factors underlying human interactions with the natural environment by assessing and exploring the individual and collective aspects of cognition (the understanding of environmental problems) and commitment (the willingness to engage in actions that will ameliorate such problems) (Newell, McDonald, Brewer & Hayes, 2014). Onyenankeya and Salawu (2018) point

out that in South Africa not all citizens, predominantly in rural communities, consider water conservation as a social priority. This may be due to water conservation efforts relying mainly on persuading rural residents to take on new behaviours declared beneficial by the promoting agencies or authorities often disregarding other dynamics underpinning their water use behaviour. Additionally, Rashid and Mohammad (2012) indicate that it is not only important to examine the chemistry, biology, physics, ecology, or economics of environmental problems; but it is also crucial to understand the significance of the behavioural dimensions as well as to study ways we can influence and change behaviour.

The recognition of the role of human behaviour in conservation matters has encouraged the use of the science of human behaviour to further understand the root of the problems and create strategies for solving them (Rashid & Mohammed, 2012). According to Koger and Winter (2010), the most crucial determining features of behaviours are our cognitive processes. Cognitive processes are defined by Brandimonte, Bruno, and Collina (2006) as mental activities composed of a variety of functions such as knowledge, perception, attention, awareness decision-making, problem-solving, planning, and executing actions.

Because of the cognitive and behavioural challenges associated with water conservation and use, there have been growing calls for the mobilisation of psychological strategies to promote water conservation (de Miranda Coelha et al., 2015; DWAF, 2004a; Russell & Fielding, 2010). McKenzie and Wegelin (2009) suggest that priority should be on efforts aimed at educating and changing consumers' perceptions and habits regarding water consumption. According to Shan, Yang, Perren, and Zhang (2015) ascertaining the behaviour and attitude of domestic water consumers allows for a proactive perspective to managing water demand. It also serves as a basis for developing intervention strategies aimed at sustainably and significantly reducing household water use.

Newell et al. (2014) state that environmental care systems such as water resource management can be generally understood by developing a mental model, which is a mental representation of the relations between causal factors and their effects. "These mental models are derived from people's beliefs and knowledge about certain

phenomena and are key to understanding their environmental decision-making. The accuracy of individuals' models of the causal mechanisms that drive environmental phenomena is a good predictor of their level of concern about environmental issues and willingness to take pro-environmental actions" (Newell et al., 2014, p. 449). In this approach, the researcher in the present study seeks to investigate these cognitive processes influencing water consumption behaviour. Specifically, the researcher aims at exploring the perceptions of community members towards water conservation to develop a psychological model that is informed by the narratives of the local community members.

1.4 Purpose of the study

1.4.1 Aim of the study

The study aims to explore the perceptions of community members in the Lephalale area toward water conservation.

1.4.2 Objectives of the study

- To determine the perceptions of community members in the Lephalale area regarding water conservation.
- To investigate what community members in the Lephalale area consider to be appropriate practices to facilitate and promote water conservation.
- To ascertain what community members in the Lephalale area consider to be practices that hinder water conservation.
- Based on community members' perceptions regarding water conservation and the associated facilitators and hindrances, develop a psychological model to promote water conservation.

1.5 Significance of the study

The current study could add more insights to emerging bodies of knowledge of Environmental and Conservation psychology as it explores the perceptions of participants regarding water conservation and develops a psychological model of

water conservation. Furthermore, the study possibly will also contribute to the expansion of the existing knowledge on the psychological determinants of water conservation by exploring practices that participants consider to hinder or promote water conservation. Lastly, the study could also assist policymakers to take into consideration the role of psychological factors that may enhance water conservation efforts in the development of national water management projects.

1.6 Operational definition of concepts

- **Water conservation:** Water conservation refers to “the protection and efficient management of freshwater resources to ensure their long-term sustainability” (Food and Agriculture Organization of the United Nations [FAO], 2012, p. 71). For this study, water conservation will be defined as the preservation and guarding of water resources; the wise use of water for different purposes.
- **Climate change:** “Climate change refers to the change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable periods” United Nations Framework Convention on Climate Change [UNFCCC], 2011, p.2).
- **Pro-environmental behaviour (PEB):** Pro-environmental behaviour refers to behaviour that benefits the environment or causes little harm to the environment (Steg & Vlek, 2009). This behaviour is generally judged in the context of the considered society as a protective way of promoting a healthy environment (Krajhanzl, 2010).
- **Water scarcity:** Water scarcity can be defined as to be defined as a higher level of total water demand than the available supply. (Hedden, 2014). “Water scarcity can also be understood as the lack of access to adequate quantities of water for human and environmental uses” (White, 2012, p. 1).
- **Water security:** “Water security is defined as the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality

water for sustaining livelihoods, human well-being, and socioeconomic development, ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability” (UN-Water, 2013, p. 7).

1.7 Outline of the thesis

The thesis is organised into eight chapters. **Chapter 1** introduces the current study and comprises the background to the study, the research problem, the purpose and objectives of the study, and the significance of the study. This is followed by **Chapter 2**, which provides the literature review. This chapter begins with a presentation of the relationship between climate change and water scarcity. The prevalence of water scarcity globally and nationally is outlined in the chapter as well. The last sections in this chapter present an outline of water conservation efforts and psychological issues related to water conservation. Thereafter, the presentation of the theoretical perspectives on conservation and pro-environmental behaviour follows in **Chapter 3**. Furthermore, Value-Belief-Norm and Afrocentric theories will be outlined later in the chapter as the theoretical frameworks underpinning the study. In **Chapter 4**, the methodology followed in conducting the study is presented. The research design, data collection, and analysis methods are outlined in this chapter. The issues of quality of the research as it pertains to this study are outlined. Lastly, ethical issues adhered to while conducting the study will be presented. The findings of the study are presented in **Chapter 5**. The first part of this chapter comprises the presentation of the demographic profile of the participants and the next part of the chapter will present narrative synopses of participants. In **Chapter 6**, the findings of the study concerning the literature reviewed are discussed. Subsequently, **Chapter 7** outlines and discusses the proposed model to explain water conservation in the context of this study. Lastly, **Chapter 8** provides the conclusion of the study by outlining the summary of the study, the implications, and limitations of the study, as well as recommendations for future research, training, and clinical practice.

1.8 Concluding remarks

This chapter outlined the study background, which covered matters relating to issues of global challenges of water scarcity. The contributions of human behaviour to the

challenges of water scarcity were highlighted, as well as findings from various studies. Subsequently, the chapter provided definitions of concepts relevant to the current study and the aims and objectives of the study. This chapter concluded by presenting the significance of the study and outlining the layout of the thesis. The following chapter presents the literature review relevant to the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In this chapter, the global prevalence of water scarcity will be investigated followed by the deliberation of causes, effects, and coping strategies for water scarcity. The uses of water and legal frameworks for water management will also be presented. Subsequently, the relationship between psychology and conservation will be explored. Factors that affect and influence water conservation are also presented. In the last part of the chapter, the relationship between culture and water conservation is discussed.

2.2 Water scarcity

2.2.1 Global prevalence of water scarcity

Water scarcity ranks as the third most concerning global risk, with the nature and the extent of the water crises varying from one country to another. Water scarcity involves two phenomena, that is, the growing freshwater consumption, and exhaustion of utilizable freshwater supply leading to water stress, inadequate or shortfall (Hedden & Cillier, 2014; Schwerdtner, Husain, Ferse & Maria, 2012). Furthermore, Hanjra and Qureshi (2010) report that water scarcity affects most of every continent and around 2.8 billion people worldwide lack access to clean drinking water. Disturbingly, Van Der Merwe-Botha (2009, p. 6) reports that “freshwater resources around the globe are limited, as 99% of all water is saline (and becoming more so through the actions of humankind), and only 0.3% of all freshwater is fit for consumption”. The limited availability of freshwater leads to chronic water stress and crises, amongst other challenges. Water scarcity is increasingly becoming a concern both globally and locally. Rogers (2008) also warns that freshwater sources are compromised by waste, dumping of industrial pollutants, and fertiliser runoff, thus affecting the availability of freshwater. Currently, the water demand exceeds the supply, hence around 1.2 billion people have limited access to drinking water globally, and this situation shows no improvement (Tal et al., 2006). The statement by Tal et al. (2006) suggests that there is insufficient water to meet communities’ basic needs of communities across the world. These alarming reports highlight the crisis level concerning water scarcity globally.

Research estimated that water scarcity has afflicted at least 11% of the residents in Europe and the present situation of water resources appears to be under mounting pressure resulting in reduced water availability and quality (Aprile & Fiorillo, 2016; Shan et al., 2015). Unfortunately, in California (United States of America) the governor declared a state of emergency in 2014 urging everyone to conserve water. This was following the state experiencing incidences of drought and the dam levels being less than 50%. This was described as the start of California's worst drought in modern history (Porter, 2009). China is also experiencing water challenges as the balance between water availability and water use is already under stress and climate change can aggravate this situation (Rousset, 2007). Similarly, Abedin, Collins, Habiba, and Shaw (2019) report that Bangladesh is also encountering a severe lack of safe drinking water due to the outcome of gradational rise of the temperatures, sea level, and severe weather incidences such as floods, droughts, and storms. Based on the statements above, it is apparent that most countries are experiencing water scarcity and shortages, as an out-turn of climate change and more demand for water.

Newby (2002) reports that the continent Africa is the second driest worldwide, following Australia, more countries continue to experience water shortages. Corresponding with Newby's (2002) statement, Wright et al. (2005) projected that by 2025 more or less 50 percent of the 1.45 billion people Africa's predicted population will experience water stress or scarcity. The reports by Newby (2002) and Wright et al. (2005) imply that most sub-Saharan countries are currently encountering water shortages and this challenge will endure to be the issue for the foreseeable future. Thus, Matchaya, Nhamo, Nhlengethwa, and Nhemachena (2019) also report that there is an anticipated decrease of about 20% in yearly precipitation by 2080 in the Southern African Development Community (SADC) which will lead to a reduction in water resources. For instance, Botswana, a semi-arid, water-scarce, and drought-prone country; not only lacks surface water but its key surface supplies are located distant from demand areas, placing substantial costs on the exploitation of limited surface water resources (Marandu, Moeti, & Joseph, 2010).

South Africa, on the other hand, is classified as the 30th driest country globally with an average yearly rainfall of 450 mm, just below the world average of 860 mm. The country as well is prone to frequent and occasionally prolonged droughts which

subsequently affect the water availability. (Hedden & Cilliers, 2014; Kohler, 2016). According to the Water Wheel (2007), the challenges of water availability in the country are being further exacerbated by several important issues, namely, population growth which directs demand, economic growth, the necessity to upgrade livelihoods, nonstop freshwater sources pollution, and the likely scourge of climate change. As reported in the World Cup Legacy Report (2011) the events of another extended period of drought in South Africa will result in acute water shortages and could result in extreme measures to limit water usage. On top of the future years, an expanding population and water use demand will pressurize the global water resources. Molobela and Sinha (2011) estimate that millions of people in South Africa will face complete water scarcity by 2025. This means that people will not have adequate water resources to sustain their contemporary level per person for domestic motivations. The implications of Molobela and Sinha's (2011) assertions are that South Africa, like most African countries, is experiencing a high prevalence of water scarcity. In years to come, people are not going to have water for their everyday activities. Donnenfeld et al. (2018) state that although the early 2017 showers of rain have provided a short relief from the 2014–2016 drought, However, South Africa is still overusing its renewable water resources and, without adding new interventions, will carry on doing so at a time that is not long from now. This statement suggests that despite previous rainfalls, South Africa continues to excessively use its water resources without other alternative actions for improving the water resources.

Water scarcity has reached a crisis level in many parts of South Africa. For example, in Cape Town in Western Cape province, the water scarcity crisis was exacerbated by the inadequate 2014/15 winter rainfalls which led to extremely low dams (Muller, 2017). The Saldanha and Stellenbosch municipalities also in the Western Cape are experiencing the same level of emergency for water supply as scarcely precipitation is mostly likely anticipated (Masante et al., 2018). World Cup Legacy Report (2011) predicted that the city of Johannesburg in Gauteng province is as well probable to diminish water should a very bad drought happen in the upcoming 10 years, as water wastage turned out not been stemmed and new sources of supply are still 10 years apart. Disturbingly, Maponya and Mpandeli (2016) report that five provinces in South Africa; namely Mpumalanga, Free State, North West, Kwa-Zulu Natal, and Limpopo

were declared to be disaster areas as a result of the drought. The KwaZulu-Natal Provincial Government also proclaimed the province a disaster region in 2014/2015 following inadequate rainfall in multiple parts of the province resulting in a drop in river and dam levels in the region (Tibane & Honwane, 2015). Similarly, water security in the Eastern Cape province is also under threat due to a lack of rain resulting in some parts of the province being water-stressed, with dams and erected boreholes getting dry (Department of Water and Sanitation [DWS], 2020). It is evident from the reports presented above that most parts of South Africa are at a crisis level regarding water scarcity. Various provinces were declared disaster areas due to prolonged periods of no rainfall leading to drops in dam levels. Limpopo province is of these provinces.

Environmental Resources Management for Southern Africa [ERM] (2017) reports that Limpopo province encountered several drought incidences a while back which has been reported widely in the media, such as (but not limited to) 2003, 2009, and 2015-2016. These have impacted negatively on the communities and led to Limpopo Province being categorized as a drought disaster region; particularly during the 2015 drought. In line with the report above, Majuru (2015) states that in some rural communities of Limpopo, the supply of water may be unavailable for weeks and the quality of water consumed at the point of use at times does not meet national drinking water quality standards. It appears it is not only the rural communities who are experiencing water scarcity problems because Polokwane municipality manager, Makgape Makobe reported that the municipality is in a water crisis and is unable to provide residents with water for 24 hours a day. The municipality opted to introduce water shedding in the city and surrounding areas (Baloi, 2020).

Hedden and Cillier (2014) point out that water resources are under threat in the Lephalale-Waterberg area, due to the mining and combustion of coal. In support of the statement by Hedden and Cillier (2014) Lephalale Municipality Integrated Development Plan [IDP] (2014-2016) adds that the construction project of the Medupi power station in Lephalale which commenced in 2007 has caused huge pressure on the municipality for the provision of more potable water in the town. Phadi and Pearson (2018) indicate that although the municipality has an important mandate of providing water to the residents of Lephalale, they operate in crisis mode while waiting for long-term, sustainable solutions from the provincial and national governments. In the

meantime, the villages are the most acutely affected by the lack of water, and a lot of the villagers are still compelled to fetch water from the taps. Sadly, the Annual Report of Lephalale Municipality (2012-2013, p. 41) indicates that “35.6% of the rural population does not have water that falls within the RDP standard of maximum cartage distance of 200 metres from point of use.” It is evident from the statements above that the area of Lephalale is facing concerning water scarcity and challenges with the rural communities being the most affected.

Molobela and Sinha (2011) point out that in South Africa, there is serious inequity regarding accessibility to and control water, and people who are commonly disadvantaged of the benefits of water and suffer from life-threatening water scarcity the most. For example, in Vaalwater (Waterberg region) there is an unequal water supply whereby game farms in the area enjoy a secure water supply, whilst the rural poor suffer severe water shortages (Phadi & Pearson, 2018; Marcatelli, 2017). The statements above are supported by Walker (2005) who indicates that since the end of apartheid in South Africa, inequality in the accessibility of water continues to be experienced particularly by most of the black population whose access to water for domestic use (such as drinking) is of much importance and immediate need. It is apparent from the above statements that even post-apartheid, there is unequal access to water and the black, rural, and less fortunate communities suffer the most in this regard.

2.2.2 Causes, effects, and coping strategies of water scarcity

2.2.2.1 Causes of water scarcity

a) Climate change

Climate change is one of the world’s greatest challenges that affect the availability of water and water security in communities. Climate change poses a great threat to the world’s freshwater resources, impacting both water availability and quality negatively. Consequently, these impacts of climate change and other factors; clean drinking water is inaccessible to the majority of people across the world (Dean, Fielding, & Newton, 2016; Pearson, Mayer & Bradley, 2015; Shan et al., 2015). The outcome of global climate change has main consequences for water resources including higher

evaporation rates, water temperatures and percentage of precipitation received as rain, shortened runoff seasons, and water quality reduction in both inland and coastal regions (Adams & Peck, 2008). Raneesh (2014) further indicates that the streamflow and groundwater recharge may directly be impacted by the effect of climate change on water resources.

The negative impacts of ongoing climate change include challenges such as changes in water quality, quantity, and availability. Further; recurrent and extreme droughts due to climate change will have concerning management implications for water resource users (Intergovernmental Panel on Climate Change [IPCC], 2001; Adam & Peck, 2008). Additionally, Varghese, Veetil, Speelman, Buysse, and Van Huylbroeck (2013) report that in Africa safe water resources are inaccessible to over 30% of the population as a result of the effects of global change on the availability of water. The major impacts of climate change in southern Africa are experienced through water resources and are manifested through water rationing as well as in water and food insecurity (Matchaya et al., 2019). McNally et al. (2019) express concern for future chronic and acute water scarcity in Africa which may be due to large population growth and climate change decrease in precipitation and runoff. Similarly, Ziervogel et al. (2014) mention that South Africa's water resources are substantially threatened by climate change.

EcoAfrica (2015) states that, in all likelihood climate change will influence the water resources in Limpopo Province such as; reduced water availability in rivers resulting from hiked temperatures and evaporation, together with shifts in the schedule and total precipitation. According to ERM (2017), Lephalale is vastly affected by climate change with the climate in the area varying from set off both warmer and drier (south to north) affecting the precipitation levels of rainfall. The temperature in Lephalale ranges from 15.7° C to 32.7° C in different seasons and extremely high temperatures of 43.6° C have been noted previously during the hottest months of the year (January and February). Therefore, this makes the area at risk of utmost weather incidents such as flooding, drought, and wildfires (ERM, 2017). Based on the statements and concerns above, it is evident that the ongoing effects of climate change on weather conditions create valid anxieties for the future of water resources. Severe weather conditions

such as flooding and drought affect the standard and the amount of water supply across the world as discussed above.

b) Poor planning and governance

The quality and reliability of water services are threatened by the deterioration of water infrastructure. A vital step to ensure safe drinking water is to protect the infrastructure utilised to treat and transport water (including sources, treatment plants, and distribution systems). However, maintenance of water storage, treatment, and distribution systems has been disregarded for years in most cities across the world. (Khatri & Vairavamoorthy, 2007). This is also supported by Pamla, Thondhlana, and Ruwanza (2021), who report that people in Makhada (Eastern Cape: South Africa) considered water scarcity to be a result of the municipality's failure to invest in the maintenance and development of the available water infrastructure during a time where the population and water demand continues to rise. What is suggested by the statements above is that poor maintenance, protection, and expansion of current water infrastructure by authorities contribute to water scarcity. This is because the population continues to grow whilst the infrastructure remains the same and poorly maintained.

Khatri and Vairavamoorthy (2007) further express that the existing infrastructure is deteriorating and it is financially challenging to maintain and upgrade it in a manner that continues to deliver quality water to all sectors. In Makhanda reservoirs in impoverished communities were previously designed to supply water to limited homes; however, the area is experiencing an increase in the amount of urban poor population and inadequate precipitation patterns, which lead to the reservoirs not being to meet rising water demand (Pamla et al., 2021). Similarly, the findings by Pearson, Mayer, and Bradley (2015) show that a short-term cause of water insecurity in rural villages of Uganda is the absence of proper maintenance or management of water sources by the water management committee.

c) Theft and vandalism of water infrastructure and illegal connections

Peal (2014) reports that the acts of vandalism and theft of valuable water supply tools such as metal pipes and fittings lead to increased operation and maintenance costs (i.e. repair or replacement of vandalised pipes) and reduced access to a suitable

quantity and quality of water. The statement by Peal (2014) is in line with the findings by Mathipa and Le Roux (2009) which found that the lack of sense of ownership by community members in Steelpoort (Greater Tubatse Municipality) led to theft and vandalism of communal water infrastructure.

Theodory and Ndunguru, (2013) express concerns that illegal water connections also cause a lot of water loss and affect the provision of water to formally connected households as required. This is in line with the findings by Mathipa and Le Roux (2009) who found that the Intermittent or irregular water supply in the Steelpoort area is often due to illegal water connections and water piracy by thieves who steal municipal water from standpipes. The findings by Mathipa and Le Roux (2009) imply that water scarcity can be caused and worsened by the lack of ownership by community members leading to theft, vandalism, and illegal water connections.

2.2.2.2 Effects of water scarcity

a) Psychological effects

There is a high prevalence of mental health problems, stress and worry are significantly higher in rural residents with water shortages. Rural citizens with drinking water shortages had elevated levels of negative emotions than rural citizens who had no drinking water shortages (Khodarahimi, Boogar & Johnston (2014a). Similarly, Coêlho, Adair, and Mocellin (2004) indicate that individuals in the areas with water shortages had significantly higher levels of emotional distress than individuals in the no-drought areas. Sartore, Kelly, and Stain (2007) echo the same sentiments that prolonged drought is a serious stressor for rural communities and may lead to emotional distress, worry, and increased irritability. Emotional reactions to water shortages in rural regions include anguish, pessimism, mental distress, guilt, anger, being overwhelmed by negative emotions, and irritability (Khodarahimi, Deghani & Nikpourian, 2014b).

Tshabatau (2020) conducted a study on the effects of water scarcity on women in Gakuto (Kweneng District: Botswana) and found that the women in the district have experienced feelings of embarrassment due to altered bathing routines and skipping showers as a result of water shortages. This is supported by the findings from a study Bulled (2017) conducted which found that people conveyed fear, annoyance over the

quality of water, and worry. Bulled (2017) further found that people felt distressed, shame, and embarrassed about their water shortage situations and concerning money or wasting time to acquire water. Taing, Chang, Pan, and Armitage (2019) report that Cape Town residents responded in various ways when the City focused on reducing water demand through changing water-use behaviour. Some residents lashed out in anger at the city for not planning sufficiently for the severe drought from 2015 to 2018; whilst others reported distress concerning money or wasting time to acquire water, particularly during the wet season.

Mushavi et al. (2020) also found that there was increased bother and distress in rural Uganda due to altered water availability resulting from the lack of proper maintenance of water systems and infrastructure by authorities. These findings suggest that insecure water availability causes trouble to communities and causes distress. Interestingly, Bulled (2017) found that people felt anger toward other community members over the unsuitable water usage, which led to the municipal stopping water supplies. This suggests that the community's feelings of distress and anger are not only directed at people in authority but also at each other, especially at those who use water inappropriately. Pamla et al. (2021) also report that water shortages cause a major lifestyle disruption, particularly in low-income households as reservoirs in low-income areas cannot supply water for the growing demand due to the increasing population. Sadly, Hove et al. (2019) found that water shortages were a significant source of stress, personal unhappiness, and embarrassment for community members. Water scarcity and shortages have dire effects on the mental health of rural communities. People struggle emotionally due to the complete lack of water or inconsistent access to water.

b) Human health effects

According to Popkin, D'Anci, and Rosenberg (2010), water is very essential for human life and humans can survive without water only for days. Furthermore, water is intimately related to health because pathogens are conveyed by water to people, and supplies the habitat for vectors and intermediate hosts of pathogens. Therefore, lack and shortage of water restrict the ability of families to cope with these threats and the poor-quality use of water only worsens health issues resulting in further illness and

infections (UN-Water, 2007, IPCC, 2001). IPCC (2001) reports a concerning figure that over 3 million people globally die each year from water-related diseases that can be avoided resulting from either (or both) the contamination of water by humans/ animals and poor personal hygiene as a result of shortage or lack of water. This implies that water scarcity can lead to dire consequences for both humans and animals. Unfortunately, women in many rural areas worldwide suffer permanent skeletal damage because of carrying heavy water containers for distances every day (UN-Water, 2007). Supporting the statements above, Ziervogel (2018) also indicates that the availability and quality of water directly affect the health of communities and may increase the prevalence of vector-borne diseases. Thus, the provision of clean water to the communities is important to decrease outbreaks of water-borne illnesses such as cholera, because people will avoid drinking water from contaminated streams and rivers (Masibambane, 2006).

c) Economic effects

EcoAfrica (2015) indicates that water is a major constraint for growth and development in Limpopo Province. A reliable supply of higher-quality water is very critical for the development of the province. Furthermore, Sartore et al. (2007) report that drought causes financial hardship to farmers and other businesses, limiting their ability to grow and employ more staff. Unfortunately, there is increased debt on farms and farmers have difficulties in palling for stocking, crops, breeding, succession, and improvements. Kohler (2016) also indicates that water plays a key role in economic activities, thus, people are obstructed from work and academic opportunities as they spend more time fetching water due to reduced water quantity and quality. The lack of water leads to financial struggles for businesses, communities, and individuals.

Ziervogel (2018) further highlights that because many homes in Southern Africa still do not have piped-in water, household members must get water from standpipes or buy it from vendors. This means that households incur significant direct costs from strategies such as drilling wells and installing water storage tanks to deal with water scarcity in their areas and have access to water (Majuru, 2015). Rodda, Carden, Armitage, and du Plessis (2016) reiterate that unfortunately for society's most vulnerable citizens, water scarcity has a direct impact on water affordability and

accessibility. What is suggested here is that accessing good quality water has become an expensive exercise for communities as they must spend their hard-earned money to get water privately. sources. Thus, Thomas and Godfrey (2018) found that water-related emotional distress was positively associated with the cost of getting water. This is because a bigger amount of household income may be spent on water distributed from private sources, such as tankers, to supplement the lack of water locally (IPCC, 2001).

d) Relational/Social effects

Water scarcity or changes to the accessibility of water have the potential to increase conflict amongst communities and different sectors. The pressure on water resources increases due to the competing demands of private, agricultural, and industrial uses for water. Unfortunately, this may worsen the conflict in existing water-stressed areas among local communities competing locally for access to natural springs and rivers, as well as lead to conflicts on a larger international transboundary scale between countries sharing a very limited and essential resource (IPCC, 2001; UN-Water, 2007). This is supported by EcoAfrica (2015) which also states that the current supply of available and renewable water in the Limpopo province will not meet future demand, resulting in conflicts amongst sectors and limitations on socio-economic development. Additionally, water scarcity and insecurities may precipitate interpersonal conflicts over water, between users at the local and regional levels within countries (Ohlsson, 2000; Pearson et al., 2021).

Hove et al. (2019) found that there was an increase in conflicts and tension among households over mobile water tankers and who gets water first. Similar findings were reported by Mukuhlani and Nyamupingidza (2014) who found that in Bulawayo (Zimbabwe) water restrictions and shortages led to conflicts as residents from Nketa 9 flocked to Nketa 7 with containers to secure water. Mushavi et al. (2020) also found that water conflict was not only among family members of one household but also with other people in the community. This is because excess water demand at public water sources frequently caused verbal and physical disputes and conflicts among people in the queue. The findings above support the statement by Pamla et al. (2021) that the

disproportionate impact of water scarcity on vulnerable groups can be a source of conflicts among communities.

e) Effects on the livelihood of communities

The unforeseeable rainy seasons and time of days without rain can often destroy agricultural production, leading to food shortages. This is affecting the communities' livelihoods (UN-Water, 2007; Ziervogel, 2018). The economy of many African and low-income countries is highly dependent on agriculture which is viewed as the principal possibility for social and economic development amidst the deprivation of alternative economic opportunities in rural areas water. Therefore, water scarcity affects agriculture as it causes the failure of crops, mortality of livestock, food scarcity, starvation, and human migration. This implies that water availability is linked closely to poverty eradication efforts, particularly in rural communities (UN-Water, 2007; Water Scarcity & Drought Summit, 2016).

Masibambane (2006) states that as a result of the lack of water availability in communities, people, especially women and children may be inconvenienced by using their social time to look for or fetch water. This is because women and children are mostly the ones in charge of chores such as fetching water in the homes. Thus, accessibility of water at the household level is vital for productive livelihoods. Likewise, Ziervogel (2018) points out that the time people spent fetching water could be spent on things like going to school or engaging in economic activities. What is suggested here is that, due to water scarcity, people (particularly, women) spend a lot of time fetching water instead of engaging in economic or social activities. A study conducted by Wutich (2006) found that people's sociability decreases as water scarcity worsens during the dry season. In addition, Hove et al. (2019) indicate that water shortages were disruptive for community members who continually had to collect water. Similarly, Mushavi et al. (2020) found that fetching water from far water resources disrupted or took over people's daily schedules and disorganised the chores. For instance, water insecurity made it difficult for some women to maintain good hygiene, which potentially jeopardized their standing with others in the community (Mushavi et al., 2020).

2.2.2.3 Coping strategies for water scarcity

a) Recycling/Reusing water

Rodda et al. (2016) indicate that water re-use in both rural and urban environments is a critical technique for overcoming the water scarcity crisis in South Africa. A study conducted by Adeniji-Oloukoi, Bob, and Moodley (2013) in the Oke-Ogun region (Nigeria) discovered that households adopted the water reuse method to cope with water insecurities. Like these findings, Mukuhlani and Nyamupingidza (2014) found that residents in Bulawayo (Zimbabwe) did not throw away bathing and washing water, but used it to flush the toilet and for other household chores. Additionally, Tshabatau (2020) discovered that households in the Kweneng district (Botswana) reused water to water plants, washing toilets, and clean the house to cope with water scarcity. In support of the above research findings, Mushavi et al. (2020) also report that residents in rural Uganda developed some household water management strategies such as recycling or rationing water. Based on the findings above, it can be concluded that people in both rural and urban areas are choosing to recycle or reuse water as a way to cope with water shortages in their areas. Water is being re-used for irrigation, cleaning, and sanitation purposes.

b) Using water storage

Adeniji-Oloukoi et al. (2013) found that households in Oke-Ogun (Nigeria) employed water storage and handling as one of the coping strategies to protect drinking water after collection from water points or sources. These results are supportive of the findings by Tshabatau (2020) who found that another coping strategy adopted by households in Kweneng District (Botswana) is storing water in tanks and buckets for later use. In line with the findings above, Mukuhlani and Nyamupingidza (2014) discovered that residents in Bulawayo stored water in buckets and other available containers to deal with water shortages.

c) Rainwater harvesting

Rainwater harvesting involves collecting rainwater from the building roofs and storing it for later use and is important to reduce the decline in groundwater levels and

conserve water during the rainy seasons (Kumari & Singh, 2016; Mukuhlani & Nyamupingidza, 2014; Theodory & Ndunguru, 2013). Olokesusi (2006) indicates that in most African countries, rainwater collection or harvesting is extensively and practiced for domestic consumption and to provide water for backyard gardens (farms), and domestic livestock. Studies conducted by Adeniji-Oloukoi et al. (2013) and Tshabatau, (2020), respectively, support the sentiments above. They found that households harvested rainwater during the rainy season and this enabled them to have expansion of water access and cope with water shortages.

d) Drilling boreholes

Theodory and Ndunguru (2013) report that water shortage has resulted in the residents of the Dar es Salam (Tanzania) area opting to drill boreholes to supplement the inadequate piped water. Similarly, a study conducted by Majuru (2015) in Makhado (Vhembe District, South Africa) found that wealthy households cope with water scarcity by using strategies such as privately setting up boreholes in their yards and installing water storage tanks. The findings by Majuru (2015) are in line with those of Mmbadi (2019) who found that community members in the Greater-Giyani municipality drilled boreholes to cope with inadequate water availability. Based on the findings above, it is apparent that setting up private water sources is one of the coping strategies people use to cope with water shortages. However, this strategy may imply that people would incur extra costs to have access to water, as reflected in section 2.2.2.2.

2.3 Domestic and spiritual water uses

Water is vital for human life and for the preservation of the planet's ecosystems (Fielding, Russell, Spinks & Mankad, 2012). Bertule, Appelquist, Spensley, Trærup and Naswa (2018) state that water is at the core of the sustainable functioning of the ecosystems, that is, it is vital for agricultural production, generating energy, industrial production, and domestic use. What is suggested here is that water is very significant for the survival of humans, animals, and plants. Water can be used for and in various activities across the world. Olokesusi (2006) indicates that water could be used for many purposes such as drinking, laundry, livestock, cooking, and irrigation farming. Coetzee et al. (2016) found that water is used for basic needs such as bathing,

cooking, personal hygiene, flushing toilets, laundry, and gardening. In addition, Tshabatau (2020) found that women in Kweneng District (Botswana) utilise water for their different household activities namely; washing, cleaning, bathing, and cooking. Oageng and Mmopelwa (2014) express that water is a valuable resource with several uses such as drinking, cooking, bathing, recreation, gardening, agriculture, and maintenance of the environment. Although the above statements describe the uses of water mainly in domestic and agricultural settings, IPCC (2001) suggests that water is essential for industrial uses by providing the necessities for sustainable economic growth and development goals. Based on the assertions and findings above, it can be concluded that water has various uses in different contexts.

Zenani and Mistri (2005) highlight that from an African perspective water is important, not just for social and economic reasons but it also has cultural and spiritual significance. Water has a powerful connection to the physical and spiritual well-being of humankind. Different religions, cultures, and social groups depend on water and have strong spiritual connections with water as a means of purity before their Gods (Behailu, Pietilä, & Katko, 2016). Olokesusi (2006) echoes the statements above by indicating that in most African rural communities, the spiritual dimension of water and water conservation has been acknowledged. This explains why traditional officials such as the earth priests, the spirit mediums, and rainmakers, exist in African communities and are often consulted for water management issues in such communities. Similarly, a study conducted by Coetzee et al. (2016) in the North West province (South Africa) found that water has spiritual and cultural meanings in some African communities. Water was also perceived as another means to create contact with ancestors, and for performing spiritual rituals such as cleansing before and after funerals and churches. This implies that water also has spiritual uses in some communities and religions. That is viewed to have significant bonds with the spiritual well-being of humans.

2.4 Legal frameworks for water management in South Africa

The South African government committed to significant reforms since 1994, to address inequalities inherited from the apartheid era. This involved adoption of new legislation that governs water and promotes equity and sustainability (Perret, 2002). The South

African Constitution which contains the Bill of Rights was promulgated in 1996. Amongst others, it aims to preserve the basic human right to have access to sufficient water and a safe healthy environment. This means that people must be able to access a certain quantity of water daily and that the water not be contaminated (Bill of Rights, 1994). According to Hove et al. (2019), some legislations and policies such as the National Water Act of 1998 and the Water Services Act of 1997 were developed after the apartheid era to rectify discrimination, encourage fair access to water, and be support system for municipalities in their efforts for to provide water services. The Water Services Act, 1997 (Act 108 of 1997) outline the legal obligations of municipalities as they provide water and sanitation following the national standards and norms. This Act further gives the Minister of Water and Sanitation executive authority as well as responsibility for supporting and strengthening municipalities' abilities to manage their businesses and fulfil their functions (Tibane & Honwane, 2015).

The National Water Act, 1998 (Act 36 of 1998) was also developed to ensure that South Africa's water resources are well secured, utilized, created, maintained, managed, and controlled sustainably and equitably, for the benefit of all people (National Water Act, 1998). Kohler (2016) indicates that the National Water Act 36 of 1998 recognised water as a national asset and a strategic resource for the country's economic and social development. Furthermore, the National Water Resource Strategy (NWRS) was developed and the first edition was published in 2004 in terms of Section (5) National Water Act (36 of 1998). The NWRS was developed to support the demand side approaches and it focuses on water conservation and the management of water demand as key priorities. The NWRS recognizes that efficient use of water joints, pollution reduction, re-use and recycling of water, and water-efficient technologies can help to manage water demand and conserve water. The NWRS is reviewed every five years (Mukheibir & Sparks, 2003; Tibane & Honwane, 2015).

South Africa appears to have firm legislation in place to regulate water management and demand. However, DWAF (2004b) expresses concern that regardless of the national policies and interventions put in place to address water scarcity, water conservation remains a major problem in South Africa. This concern suggests that

water conservation continues to be a challenge in the country despite the policies the government has developed to regulate water management. Hence, Pamla et al. (2021) warn that if authorities do not invest in behavioural water conservation strategies, they will struggle to fulfil the mounting demand for water. The continuous challenge of water conservation may be due to commitment issues between communities as authorities, as well as the not acknowledging the role of human behaviour in conservation matters, as discussed in section 1.3.

2.5 Water conservation

2.5.1 The psychology of water conservation

2.5.1.1 Disciplines of psychology in conservation

The realisation and belief that psychology is a key constituent of sustainability and conservation produced two fields in psychology; namely, environmental psychology (developed in the late 1950s) and conservation psychology (developed in the late 1990s). These fields are relevant to conservation initiatives because environmental problems are a function of human behaviours (Clayton & Saunders, 2012; Pearson, 2013). Below is a brief discussion of each field:

a) Environmental psychology

According to Forster (“n.d”), environmental psychologists’ study, explain, and predict how behaviours of people can be improved to promote actions fostering environment-sustainable behaviour and conservation. Environmental psychology is a broad and multidisciplinary field that studies the interactions between communities and the environment as well as natural landscapes and built environments. It covers topics such as wayfinding, restorative environments, and the management of shared spaces and resources. Thus, the most important role of environmental psychologists is to use psychological knowledge to aid in the preservation of the natural environment; explain the reasons people participate in pro-environmental behaviour that can assist lessen climate change effects and assist communities to overcome the psychological hindrances of sustainable behaviour (Sörqvist, 2016).

Moser and Uzzell (2003) further state that Environmental psychology studies people in their physical and behaviour. In this approach, Clayton and Saunders (2012) add that there are three major themes emphasised by Environmental psychology, namely; the need to understand behaviour in context (people in a specific place), a recognition of the reciprocal relationship between people and their environments and a need for an interdisciplinary approach. Other branches of psychology often neglect or underestimate these themes. Most importantly, Sörqvist (2016) suggests that among other activities, environmental psychologists can assist by identifying behaviours that need to be altered to expand the quality of the environment, identifying the elements that influence these behaviours, as well as developing and evaluating strategies for changing these behaviours.

b) Conservation psychology

Conservation psychology, on the other hand, aims at comprehending and encouraging peoples' concerns about nature and conservation efforts by utilising the insights and tools of psychology (Clayton & Saunders, 2012). Saunders (2003, p.138) encapsulates the essence of Conservation psychology by defining "Conservation psychology as the scientific study of the reciprocal relationships between humans and the rest of nature, with a particular focus on how to encourage conservation of the natural world". Furthermore, Clayton and Saunders (2012) clarify that Conservation psychology is not just an applied field that is only concerned with comprehending factors that determine pro-environmental behaviour. However, conservation psychology also emphasises focus on changing behaviour; emotional relationships to natural objects (such as animals and places); and communications about environmental matters.

Saunders (2003) indicates that the desire to promote people's concern and protection of the environment motivates Conservation psychology. The subfield also consists of a network of practitioners and scholars collaborating with efforts of understanding and encourage healthy relationships between humans and the environment. This subfield aims to determine which strategies are most effective in promoting environmental awareness, as well as which personal attributes, experiences, attitudes, and behaviour predict conservation intentions and behaviour. (Tal et al., 2006). Accordingly, the

current study is therefore affiliated with the subfield of conservation psychology because it aims at understanding the perceptions of participants with a focus on developing a model for water conservation.

2.5.1.2 The Importance of Psychology in Conservation

According to Winter and Koger (2010), human behaviour is accompanied by beliefs and attitudes that make things seem sensible, even though they may be jeopardizing all life. Thus, solutions to environmental problems require that individuals and communities adapt psychologically among others, changing the way they relate to nature. Corral-Verdugo et al. (2012) emphasise that it is imperative to find solutions to environmental problems by exploring human psychological processes since problems (such as water scarcity) are partly attributable to human psychological factors. The assertions above portray that there is an ongoing interaction between humans and their environment. Hence, psychology is vital in understanding this relationship as well as factors that influence or affect the relationship. Consequently, Newell et al. (2014) indicate that psychological susceptibility has ramifications for the manner people interpret environmental issues as well as our willingness to take pro-environmental decisions and cooperated in shared attempts to address environmental challenges. Environmental protection, restoration, and conservation are some of the major challenges faced by our society, hence, it is fundamental to understand pro-environmental behaviours in populations, as well as the factors that determine them (Bronfman, Cisternas, López-Vázquez, Maza & Oyanedel, 2015).

Klockner (2013) further suggests that to address global environmental challenges (such as water scarcity), it is vital to understand how people make judgments about relevant environmental behaviour because a move to alternative behaviours can make a huge difference. Forster (“n.d”) explained that individuals often locate themselves in environments through an active process of creating internal representations or cognitive maps consisting of experience and current perceptions. These include representations of cognitions, effects, and behaviour and they enable us to make decisions, plan our movements as well as navigate through the present environment. Furthermore, Newell et al. (2014, p. 461) suggest that “the psychology underlying environmental decision-making can be understood by addressing individual and

collective cognition of an environmental problem and commitment to supporting interventions to improve that problem”. It is evident from the statements above that interaction between humans and the environment is influenced by various psychological factors such as cognitions, beliefs, attitudes, affects, decisions, and behaviour. Thus, it is vital to acknowledge these psychological constructs when addressing matters relating to conservation or pro-environmental behaviour.

Russell and Fielding (2010) also concur that acknowledging that water use behaviour is important to water demand management emphasises the necessity for an improvement of the psychological processes that underpin the domestic demand for water. As de Miranda Coelho et al. (2015) explain that psychology must play a more active part, first identifying the precursors of the behaviours enhancing the quality of the environment presently and for the current and future generations and then evaluating intervention programs to ensure the promotion of the environment. Correspondingly, Steg and Vlek (2009) indicate that when environmental behaviour has been selected and its causal factors identified, intervention strategies can be targeted on the relevant factors. The sentiments above further confirm that understanding the psychological process can be useful in the management of water conservation challenges. This signals the significant need for “psychological research methods to investigate individual perceptions and cognitions, individual and collective behaviours, and psychological well-being related to climate change and conservation matters” (Clayton et al., 2015, p. 640). This research which utilises meticulous empirical methods can be used in the development of strategies, interventions, and policies regarding water management and demand.

Clayton et al. (2015) express a concern that a lot of policies regarding water conservation have been developed based on generalisations and inaccurate assumptions such as presuming that simply telling people about climate change is enough to influence their decisions and behaviours. In different parts of the world, policies to address water management have been developed as well as strategies aimed at reducing consumer demand for water. Examples of these strategies include; raising the cost of water and providing residents incentives for replacing old and wasteful appliances. However, strategies may have challenges of equity and uneven advantages or disadvantages for various households (based on affordability) (Clayton

et al., 2015). This statement by Clayton et al. (2015) regarding the inequality of water management strategies is also echoed by assertions made by various authors (IPCC, 2001; Majuru, 2015; Rodda et al., 2016; Ziervogel, 2018) as discussed in section 2.2.2.2. Kohler (2016) also adds that because in most rural African communities, water is usually considered to be a public possession, these strategies are not normally based on economic efficiency. Unfortunately, these strategies do not seek to address wasteful water use habits nor promote everyday water-saving habits. Thus, this lack of efficacy in some previous interventions highlights the of important social and psychological variables in moulding people's behaviours (Perrena & Yang, 2015). Although Khumalo (2013) found that in Bulawayo (Zimbabwe) water restrictions mitigated the scarcity of water, the city also needed to invest in changing peoples' water use habits to save a lot of water. Ideas42 (2017) suggest that behaviourally focused interventions might prove more effective in prompting people to pay closer attention to their water consumption and even commit to reducing it. In line with this statement, Pamla et al. (2021) pointed out that consumption patterns determine water supply, thus, strategies for changing behaviours are important and provide a cheaper and longstanding consistent and sufficient water use and supply.

Clayton et al. (2015) also cautioned that unless we investigate how people view climate change, its effects on human beings and water resources, and factors influencing mitigation and adaptation behaviours, effective responses to water management and conservation challenges will continue to be a problem. Additionally, Newell et al. (2014, p. 447) advise that "a complementary way to assess the psychological predispositions underlying environmental decisions is to interrogate the worldview held by a person; which captures a person's general beliefs about the relationship between humans and the environment". Some psychological constructs considered to be essential in determining water conservation behaviour and need to be investigated include attitudes, beliefs, habits or routines, personal capabilities, and contextual factors (Russell & Fielding, 2010; St John, Edwards-Jones & Jones, 2010). Corresponding with the statement above, Wauters, D'Haene, and Lauwers (2014) found that farmers' intentions are significantly influenced by the fundamental psychological constructs and that the impact can be properly understood as being mediated through self-identity and moral norms. As such, Wauters et al. (2014)

recommend that to encourage more ecological farming practices for farmers in Flanders, the aim of policymakers and extension agents should be to influence and activate the moral norms and self-identities of farmers. The recommendation by Wauters et al. (2014) shows that it is important for various stakeholders to work together regarding water management and conservation matter, this includes policymakers, researchers, and communities.

An inter-sectoral and multidisciplinary approach to managing water resources is required and it needs to consider the growth, provision, utilisation, and demand of water and emphasis individuals and their livelihood. Although governments play important roles in influencing public behaviour by providing infrastructure for changes and the supporting framework and legislation, this can be a difficult process as it relies on people's motivations and behaviours (Newell et al., 2014; UN-Water, 2007; Wesgro, 2018). Hence, Dean et al. (2016) suggest that building engaged communities incorporating cognitive, emotional, and behavioural engagement is an important part of shifting to a more sustainable water management approach. This statement implies that engaged communities understand, value, and actively support the necessary changes in technology, investment, and policies related to sustainable water management. The successful and sustainable approach to water management and conservation needs to incorporate different disciplines and the engagement of communities.

2.5.2. Factors Affecting and influencing water Conservation

2.5.2.1 Knowledge about water conservation

Knowledge and problem awareness are key aspects of environmental behaviour, particularly concerning water conservation efforts (Sarabia-Sánchez, Rodríguez-Sánchez & Hyder, 2014). This statement is in line with the assertion by Mathipa and Le Roux (2009, p. 256) that “knowledge is commonly seen as a necessary precondition for a person's behaviour hence most educational interventions rely on knowledge transfer”. Aprile and Fiorillo (2016) report that individuals who have knowledge and general concerns about the environment have a high probability of engaging in pro-environmental behaviour such as saving water at home. Thus, personal capabilities, knowledge, skills, and resources that an individual possesses

assist them to make informed decisions about conservation (Stern, 2000). Correspondingly, the findings by Dean et al. (2016) found that higher knowledge about water was linked with greater chances of adopting water-saving behaviour. The study results by Dean et al. (2016) confirm the importance of community knowledge about water conservation and the need to incorporate knowledge-building in water management initiatives.

Rashid and Mohammad (2012) further report that an individual's knowledge, experience, as well as concerns about the environment, guides behaviour that is maintainable at home, such as using water responsibly (recycling, reusing, and reducing). This statement supports Graymore and Wallis' (2010) report that practicing water conservation behaviours is impacted and hindered by numerous human and social factors like limited knowledge, and apprehension to learn new stuff about the conservation of water. no incentives and other economic matters. the adoption of water conservation practices is influenced and constrained by many situational and personal factors such as the lack of knowledge, resistance to learning new knowledge, environmental values and attitudes, lack of incentives, and economic factors. Based on the statements above, it is apparent that a person's knowledge about water conservation is important in influencing their pro-environmental behaviours. Thus, it is vital for knowledge building to be integrated with water management and conservation interventions.

Martínez-Borreguero, Maestre-Jiménez, Mateos-Núñez, and Correa (2020) suggest that to instill and build knowledge about the correct use and conservation of water in young children, multidisciplinary approaches regarding water conservation should be incorporated the school curriculum for primary schools. Additionally, the North American Association for Environmental Education [NAAEE] (2010) indicates that early childhood environmental education focuses on developmentally appropriate conservation concepts and laying the groundwork for favourable and appropriate conduct later in life. The interest in children is because they are more prone to wastewater during times for bathing or washing clothes. Thus, environmental education in children can increase knowledge as well as improve attitudes, therefore changing behaviour (Damerell, Howe & Milner-Gulland, 2013; Thomas & Godfrey, 2018). What is suggested here is that instilling knowledge about water conservation in

children will improve their attitudes and perceptions in turn influencing their pro-environmental behaviour towards the water.

It also appears that these early childhood interventions are expected to be preventative, that is, are hoped to influence their pro-environmental behaviours in adulthood. In this approach, Martínez-Borreguero et al. (2020) emphasise the need for water-related and focused education from the earliest ages for sustainability. The findings by Middlestadt et al. (2001) discovered that students who were exposed to a water conservation curriculum regularly carried out conservative behaviours. Thakur, Harris, Thakur, and Onwubu, (2019) report that residents in Waterloo Township (Kwa Zulu Natal) advocated for the environmental and conservation education of school children for children to learn to appreciate the value of water, with the hope to enhance their knowledge and change in their behaviour towards water conservation.

2.5.2.2 Attitudes, perceptions, and beliefs about water and water conservation

Individuals' thoughts and attitudes about water, as well as their specific behavioural and consumption behaviours surrounding accessible water supplies, all play a role in how humans interact with water (Coetzee et al., 2016). According to St John et al. (2010) within conservation, there has been a general perception that positive conservation attitudes are likely to be linked to pro-conservation behaviours. Consistent with the assertions by St John et al. (2010), Lee and Tanusia (2016) also indicate that when aggregated; attitudes, subjective norms, and self-efficacy could manifest into a behavioural intention. This implies that the more positive the attitude and the stronger the subjective norm as well as the greater the self-efficacy in controlling the behaviour, the more inclined the people towards performing the desired behaviour. Subsequently, several researchers investigated the relationship between attitudes toward conservation and pro-environmental behaviour. For example, in Gold Coast, Australia, Willis, Stewart, Panuwatwanich, Williams, and Hollingsworth (2011) conducted a study examining the connection between environmental attitudes on water conservation as well as residential water the relationship between environmental and water conservation attitudes and a domestic water consumer break down. The results of this study indicated that residents with favourable conservation attitudes utilised notably less water generally when taking showers, washing clothes, and doing

gardening unlike those with moderate conservation concern (Willis et al., 2011). Correspondingly, Gule, Maduku, and Dilotsotlhe (2018) found that individuals who have a positive attitude toward water conservation have a positive intention towards conserving water.

Aprile and Fiorillo (2016) also found that when a person believes that general environmental difficulties pose a threat to his or her group's welfare but not to the welfare of others, he or she will not save water. Consistent with the findings above, Anderson et al. (2006) also found that a small fraction of South Africans purifies their drinking water or consider water pollution as a serious issue. In keeping with the findings by Anderson et al. (2006), the focus group consultations in Berlen Municipality (Costa Rica) conducted by Ideas42 (2017) showed that although community members were cognisant of the need and significance of conserving water, only a few students saw it as a personal responsibility. Similarly, a study by Onyenankeya, Caldwell, and Okoh (2015) found that although most college students thought that the conservation of water was important, they don't consider it to be greatly important and their responsibility. Pamla et al. (2021) report that the residents of Makhanda municipality's view that the municipality has failed to provide water for them may negatively impact their motivation to engage in water-saving behaviours. The residents feel that it's the municipality's responsibility to improve its competency in water provision.

Onyenankeya and Salawu (2018) also indicate that in South African rural communities, water conservation is not perceived as a social priority. Kohler (2016) adds that in most communities, water has traditionally been regarded as a public good, making management strategies for water allocation and pricing an extremely sensitive topic. Furthermore, Olokesusi (2006) reports that in most African countries, surface water bodies are regarded as common property resources and all community members are entitled to equal rights and access and use of the water. A study by Onyenankeya et al. (2015) further found that the attitude of college students to water conservation is influenced by the belief that water is abundant in South Africa. The research findings above suggest that people's perceptions, attitudes, and beliefs about water and water conservation affect their water-use behaviours. These beliefs and perceptions may lead to water wastage and a lack of responsibility among communities. It is for this reason that Clark and Finley (2007) stressed the importance

of ongoing water conservation programmes that ensure that sustainable water conservation habits are created and reinforce a positive attitude toward water conservation.

2.5.2.3 Water consumption habits and Routines

Habits are developed when a person encounters a situation with the same or comparable behavioural cues, reactions, and outcomes. The action is performed frequently and repeatedly, and automaticity develops and becomes habitual. (Fielding et al., 2012; Jorgensen, Martin, Pearce, & Willis, 2012). Water consumption habits of individuals could be a barrier hindering the translation of intentions into actions (Fielding et al., 2012). Likewise, the findings by, Gule et al. (2018) found that habits greatly impact water users' water conservation intentions. Mathipa and Le Roux (2009) further discovered that residents of Steelpoort engaged in habits that wasted a lot of water. These habits included washing cars using hosepipes, using excessive amounts of water for cleaning floors, rinsing clothes, cooking, and flushing, and using hosepipes to clean paved areas instead of sweeping the area. These findings suggest that people engage in habits that are not advantageous for water conservation efforts. Hence, Marandu et al. (2010) suggest that adjustments habits can help conserve water. These adjustments include reducing the amount of water used, turning the water off while brushing teeth, turning off the tap while washing vegetables; turning the shower off when using soap, and repairing or reporting leaks to authorities.

Mathipa and Le Roux (2009) further suggest that strategies to conserve water in the home should be encouraged and developed. Strategies such as taking a shower instead of bathing, and using a bucket instead of a hose to wash the car. Consequently, Pamla et al. (2021) found that people in Makhanda (Eastern Cape) have adopted water-saving habits such as flushing the toilet only when necessary (rather than after each use), doing laundry weekly, and reducing consumption of water in various household activities daily. Similarly, Tshabatau (2020) found that households in Kweneng District (Botswana) also adjusted their daily usage routines such as bathing once a day, to conserve the little water they have.

Khodarahimi et al. (2014b) also found that residents of Fars province (Iran) also adopted behavioural changes overruling the traditions and actions of excessive water

use such as decreasing the consumption of water, water not being used for cars, carpets, and yard washing and reducing how many times people bath. Likewise, Theodory and Ndunguru (2013) report that households in Dar Es Salaam (Tanzania) have come up with strict water budgeting strategies to cope with water shortages. Clean and safe water is mainly used for necessary household consumption such as drinking and cooking whilst some household water consumption activities considered less important such as washing clothes and mopping are skipped. Based on the research findings above, it can be concluded that adjusting water consumption habits can help to conserve water as well as assist people to deal with the scarcity of water.

Incidences of water scarcity forced residents of Cape Town (South Africa) to change their water use habits by using water sparingly, changing their water consumption ways, and saving water (Matikinca, Ziervogel, & Enqvist, 2014). The Cape Town Metro introduced severe restrictions such as determining how often gardens, parks, and sports fields could be watered and prescribing methods of watering (use of buckets and water cans) with the hope of reducing water consumption (Muller, 2017). Makhanda municipality (Eastern Cape province) also advised residents to adjust their water consumption behaviours by “using water sparingly, switching taps off while brushing teeth, flushing toilets only when necessary, limiting laundry to one load a week, using plugs in water basins when rinsing dishes to encourage recycling of water” (Pamla et al., 2021, p. 4). In Polokwane (Limpopo province), the municipality urged residents to make water conservation responsibility for all by, amongst other things; reducing the lengths of showering and ensuring the water is off while applying soap, re-using water and fixing water leakages (City of Polokwane, 2020). Authorities are also implementing certain strategies and interventions to encourage community members to change their water consumption habits.

2.5.2.4 Poor-Decision making and Lack of Responsibility

Water conservation efforts are also deterred by people not viewing water conservation as their responsibility, as important, or as a great concern, as discussed previously in section 2.5.2.2, (Anderson et al., 2006; Ideas42, 2017; Onyenankeya et al., 2015). What is suggested here is that decisions people make relating to water consumption are based on their views about water and water conservation matters. Mathipa and Le

Roux (2009) report that water wastage in Steelpoort (Greater Tubatse Municipality) was also due to people deciding to leave taps running and not closing them properly in schools, residences, and outside areas as well as learners playing a fun game with water and drinking water from cupped hands instead of using cups. Disturbingly, Mathipa and Le Roux (2009) further found that community members in Steelpoort lacked a sense of ownership and felt indifferent about the state of the water sources/systems in their area. Residents also paid no attention to leaking pipes and taps and rarely attempted to repair leaks or dripping taps as it was perceived to be the responsibility of the authorities. Thus, Ralo, Grinker, Kruger, Steele, and Weitz (2000) expressed a concern that the current system of communal taps in most rural areas creates a challenge because there is no control and monitoring over individual use of the taps.

2.5.2.5 Water Contamination and pollution

Water pollution and open garbage dumping are two issues affecting water conservation efforts (Kumari & Singh, 2016). According to Bertule et al. (2018), human activity continues to be the leading cause of degradation and pollution. Numerous types of water contamination will be worsened by increasing temperatures and rainfall strength. Water quality will be affected and erosion increased. According to Marshall (2011), another major factor contributing to Kenya's escalating water crisis is the country's inability to keep clean water. This is because most Kenyans utilise pit latrines that often cause contamination of the wells. In contrast, the Akan tribe of Ghana has always been environmental consciousness and prohibited washing clothes in streams to avoid water contamination as some of the locally produced soaps had strong chemicals posing a danger to humans (Adu-Gyamfi,2011). The assertions above show that water pollution worsens water scarcity by affecting the quality of water. It also appears that, amongst others, human behaviour contributes to water pollution.

2.5.3 Institutional Interventions to promote water conservation

2.5.3.1 Educational and Awareness Campaigns

Knowledge and understanding are vital in promoting water conservation amongst communities, as reflected in section 2.5.2.1. Wright et al. (2012) indicate that it is

critical to communicate about water quality and quantity to promote water conservation in the country. Grilli and Curtis (2019) also allude that the approach of awareness and education assumes that changing attitudes or enhancing knowledge may trigger new behaviours. Educational awareness programmes have a positive influence on improving the adoption of water-saving behaviours and reducing levels of consumption. This is because recognizing the necessity of conserving water and learning how to reduce water demand water is the initial conservation and knowing what to do to minimize water demand is the first stage for families to decide to engage in behaviours that conserve water (Espineira & Valinas, 2013; Jury & Vaux Jr, 2007; Moglia, Cook & Tapsuwan, 2018). The statements above suggest that imparting knowledge through creating awareness and education can influence attitudes and decisions leading to behaviour change. In this approach, Wright et al. (2012) advocated for the use of newspapers, radio, and television as a means to ensure that information and knowledge regarding water conservation are distributed. Similarly, Grilli and Curtis (2019) advise that information resources such as handouts, bulletins, advertising campaigns, posters, and periodicals can be used in educational and awareness strategies. The Organisation for Economic Co-operation and Development [OECD] (2017) further state that information provision such as awareness campaigns to spread information about water conservation can be useful.

Meinzen-Dick and Rosegrant (2001, para. 6) add that “education, social marketing, and public awareness campaigns for behavioural changes deserve much greater attention in water demand management”. This is because being aware of water issues can inspire water conservation, and education can lead to meaningful changes in water-use habits. Furthermore, Clark and Finley (2007) stress the importance of ongoing water conservation programmes to ensure that sustainable water conservation habits are created and to reinforce a positive attitude towards water conservation. Consistent with the statements above, Matikinca et al. (2020) found that increased restrictions on water, as well as the communication about Day Zero and awareness efforts, influenced changes in residents' water use behaviours in Cape Town.

The Nelson Mandela Bay municipality (Eastern Cape) started public awareness campaigns aimed at promoting behavioural change and efficient water use. The

authorities started a 'Water Wise Campaign' which targeted communities and media sources and roadshows were used to share information with communities about water management and conservation (World Cup Legacy Report, 2011) However, Ideas24 (2017) warns that simply raising awareness about water conservation was not going to be enough to change behaviour. It would be vital to also assist people to form concrete intentions to reduce their water consumption through various interventions. In line with the assertion by Ideas24 (2017), Grilli and Curtis (2019) suggest the incorporation of outreach and relationship-building programmes such as training, and engagement of communities through workshops, events, or focus groups to build strong stakeholder and inter-community relations for effective interventions. What is suggested here, is that awareness and educational programmes may not be enough to change behaviours. However, a combination of various activities as well as community and stakeholder engagements can be more effective. The statements appear to echo assertions made by multiple authors (Dean et al., 2016; Newell et al., 2014; UN-Water, 2007; Wesgro, 2018) discussed in section 2.5.1.2.

2.5.3.2 Water Restrictions

According to Matikinca et al. (2020), water restrictions are an efficient way to cut down on residential water consumption. This includes a prohibition of certain water consumption practices such as gardening, outdoor pools, and car washing using municipal tap water. In support of this statement, Lindsay and Supski (2017) found that residents in Brisbane and Melbourne, Australia, were significantly influenced by water restrictions and curfews to change their water use patterns and embrace more maintainable water practices. Similarly, the Cape Town Metro Municipality aimed to conserve water by introducing severe restrictions such as determining how often gardens, parks, and sports fields could be watered, prescribing methods of watering (use of buckets and water cans), and introducing fines for transgressions or installing water restriction devices to non-compliant residents (Muller, 2017; Wesgro, 2018). In keeping with this strategy, in October 2019, Johannesburg Water issued notices to the residents of the City of Johannesburg informing them of the stage 2 water supply restriction. This was following a high-water demand which was unsustainable resulting in water supply interruptions. The city encouraged residents to reduce water consumption and residents were also restricted from watering gardens between 6 pm

to 9 pm in summer months, watering pavements or driveways using hosepipes (Johannesburg Water, 2019). Based on the statements above, it is apparent that authorities in different places are introducing water restrictions as a way of managing water consumption in homes.

According to DWAF (2005), water restrictions in Limpopo province were mainly for agricultural use in the Letaba and Luvhubu/Mutale catchments whilst industrial and domestic users were cautioned to use water sparingly to avoid restrictions. Consistent with this report by DWAF (2005), in February 2020, Polokwane municipality issued a public notice urging residents to use water sparingly following water levels in the reservoirs being too low. (City of Polokwane, 2020). However, the municipality further opted to introduce water shedding in the city and surrounding areas because the city was in a water crisis (Baloi, 2020). Shan et al. (2015) found that in Greece and Poland, water conservation strategies such as obligatory water restrictions and an altered water price influenced most people. Contrasting with the statements above, Hoehn (2011) argues that whilst water prohibitions might decrease certain behaviour, they have no effect on the wastage of water in unrestricted uses. Hoehn's (2011) argument suggests that water restrictions may not be effective where water use is unrestricted, for example, in cases where people use private water sources.

2.5.3.3 Use of Fines and Rewards to encourage water conservation

Penalties have the potential to be effective when prescribed firmly and offenders of water conservation attempts are made to pay. Penalisation through fines and higher taxes is thought to discourage excessive water consumption, pollution, and environmental damage (European Union, 2011; Hoehn, 2011). In line with the assertions above, the city of Cape Town introduced fines for transgressions and installed water restriction devices for non-compliant residents, to discourage behaviours that negatively affected water conservation efforts (Muller, 2017). Furthermore, the City of Cape Town introduced fines ranging from R1,000 to R10,000 throughout the water crisis in 2017-2018, which were used as punishment for transgressive behaviour and high consumption households (Parks, McLaren, Toumi & Rivett, 2019). In addition, OECD (2017) report that punishment and reward schemes such as fines for water squanderers and public rewards for households attaining,

particularly high-water savings can promote water conservation. Based on the statements above, it appears that using operant conditioning techniques such as punishment and rewards can encourage the adoption of positive water conservation behaviours.

Grilli and Curtis (2019) further suggest that other methods of promoting pro-environmental behaviours are by utilizing incentives such as cash remuneration for persons who participate in the behaviours that are encouraged. This could include financial incentives (such as discount fees, cash bonuses etc.) or non-monetary incentives (such as gifts, certificates, coupons, etc.). Consistent with the suggestions by Grilli and Curtis (2019), European Union (2011) advocated for economic incentives such as subsidising the public, offering co-funding and loans to encourage the adoption of good water management practices, and changes in water consumption patterns. Furthermore, it appears that rewarding mechanisms and environmental incentives such as tax rebates, prizes, training, naming, and providing certificates to competent water consumers can encourage sustainable and good water consumption among communities (European Union, 2011).

2.5.3.4 Use of Technology to monitor water consumption

According to Yang et al. (2016), there is a need for a persuasive technology approach in water management and conservation efforts. This approach assumes that human behaviour and attitudes may be influenced by technology. Furthermore, this approach focuses on technology-human persuasion to change, shape or reinforce users' attitudes and/or behaviour to encourage pro-environmental behaviour (Yang et al., 2016). In agreement with the statements above, OECD (2017) points out that besides behavioural interventions, consumers need water meters to match and track their water consumption.

Bertule et al. (2018) also emphasise that it is possible to use meters that are not coupled to pricing charges in rural settings at communal wells or taps. These meters can be used to detect and pinpoint leakages as well as provide information about consumer behaviour that can be used in water conservation campaigns. Consistently, Randall and Koech (2019) point out that although meters for water are often utilised for the management of water and billing in urban areas, the newly developed Smart

Water Metering (SWM) technology (Australia) which is used to measure water use, can be used to provide consumers feedback regarding their water consumption data, in turn, enhancing water conservation behaviours. The statements above suggest that people's water consumption behaviours and habits can be monitored using non-billing water metres. These metres can be used to sensitise communities about their water consumption trends and behaviours.

2.5.3.5 Collective and multidisciplinary approach to water conservation

The involvement of communities in any water conservation interventions is vital because communities must feel that they are a part of finding solutions to the water crisis (Thakur et al., 2019). The statement by Thakur et al. (2019) is supported by the assertions made by various authors (Dean et al., 2016; Grilli & Curtis, 2019; Newell et al., 2014; UN-Water, 2007; Wesgro, 2018) as discussed in sections 2.5.1.2 and 2.5.3.1. This shows that the engagement of communities in water conservation matters is of paramount importance. In this approach, Malzbender, Goldin, Turton, and Earle (2005) argue that traditional or customary structures that manage water in rural communities play a significant role in South Africa's overall water management framework. Importantly, these traditional structures can serve as a mechanism for ensuring long-term water resource management at the local level and fill the void caused by inefficient government organizations. In addition, Pamla et al. (2021) indicated that there is a great requirement for platforms wherein authorities from the municipal and communities engage about water-related concerns such as water leakages, burst pipes, and the production of adequate water quality. Correspondingly, Thakur et al. (2019) further found that the use of existing structures such as ward councillors, for more communication and education regarding water conservation and preservation is another way to influence residents' water consumption behaviours. The statements above show that water conservation is absolutely a collective effort among individuals, authorities, and various stakeholders. Furthermore, the incorporation of water conservation-related content in the schools' curriculum was advocated for by (Damerell et al., 2013; NAAEE, 2010; Martínez-Borreguero et al. 2020) in section 2.5.2.1.

Martínez-Borreguero et al. (2020) further suggest that multidisciplinary approaches regarding water conservation must be incorporated into the primary school curriculum, to instill in young people knowledge about the correct use and conservation of water. Nonetheless, Mathipa and Le Roux (2009) found that although the Revised National Curriculum Statement (RNCS) in South Africa includes structures for developing environmental awareness, knowledge, and skills at the school level, there are still significant gaps in learners' understanding and knowledge of environmental issues. Mathipa and Le Roux (2009) further advise that schools need to recognise the importance of allowing students to learn more about the environment and its natural resources, as well as nurture pro-environmental behaviour and skills that can be carried over into adulthood. The statements above suggest that including water conservation matters in the school curriculum can assist to instil knowledge about the proper use of water in children. This further confirms that sustainable water conservation requires the collaboration of people from different sectors and age groups.

Fielding et al. (2012) add that water consumption is a shared behaviour, encompassing water use actions of numerous members of a family. Thus, social influence and modelling are particularly influential on people's behaviour to adopt pro-environmental behaviours (Grilli & Curtis, 2019). This statement by Grilli and Curtis (2019) implies that if one family member is dedicated to conserving water but the other family members are not, that person's attitudes are less likely to have a positive impact on reducing residential water consumption and vice versa. Additionally, Nazneen and Asghar (2018) concur that parents can instil pro-environmental attitudes and behaviour in their children by showing and modelling the very same behaviours themselves (Nazneen & Asghar, 2018). The findings by Matthies, Selge, and Klöckner (2012) showed that parents who involve children in behaviours that are positive for the environment daily serve as role models for specific pro-environmental behaviours at home (for their children). Like the findings by Matthies et al. (2012), Nazneen and Asghar (2018) also found that parental modelling plays a vital role in shaping young people's pro-environmental attitudes and behaviour. Furthermore, Gronhoj and Thogersen (2012) indicate that parents have a substantial influence on their children's predisposition to behave favourably towards the environment, and parents serve as

crucial role models for the transfer of pro-environmental habits to the youth. The statements above suggest that people's behaviours towards water conservation can be socially influenced and modelled by those around them. It appears that parental modelling is significant in influencing children's water conservation behaviours.

2.6 Culture and water conservation

2.6.1 Effects of Culture on water conservation

Culture refers to beliefs and views that humans use to shape their daily lives, relationships, behaviours, and activities. According to Orbach, Cordero, Baleeiro-Curado, Palacio, and Veitayaki (2011), cultural differences and beliefs play an important role in determining people's perceptions, values, and water management in different cultures. The cultural beliefs about what is appropriate behaviour shape the environment in which we live and, in turn, the characteristics and the nature of the benefits we derive from that environment. This implies that this is a relationship of mutual dependence between humans and their surrounding environment. Human cultural beliefs and behaviours are the mediating forces between the two (United Nations Educational, Scientific & Cultural Organization [UNESCO], 2002). It appears that cultural differences play a key role in the way water is perceived, valued, and managed in different societies. Thus, water management strategies should be tailored to individual cultures because they have diverse knowledge and behaviour systems (World Health Organisation [WHO], (2006). Additionally, Coetzee et al. (2016) indicate that these cultural beliefs associated with water directly impact how this scarce resource is utilised. Therefore, it becomes necessary to consider the spiritual and cultural realities when developing and implementing policies aimed at water management. Furthermore, Newell et al. (2014) indicate that social norms have the power to influence environmental decision-making and behaviour. This suggests that people's understanding of accepted behaviours as a reaction to environmental threats, and their willingness to engage in environmental actions as individuals as well as make decisions as a collective relies heavily upon social norms. The statements above suggest that the cultural beliefs of various cultures affect people's perceptions and behaviours towards the water. This highlights the importance of developing culturally

appropriate water conservation strategies and interventions considering various cultural stakeholders in communities.

Makwaeba (“n.d”) accordingly expressed a concern that there is a lack of appreciation and inclusion of the local Indigenous Knowledge System (IKS) about natural resources and cultural practices ensuring conservation. Behailu et al. (2016) add that to achieve effective sustainability of natural resources, existing local knowledge should not be ignored because communities have long-served traditional management systems. Consistent with the assertion by Behailu et al. (2016), Onyenankeya and Salawu (2018) also report that water conservation is not perceived as a social priority in South African rural communities because the persuasive water conservation strategies often disregard the sociocultural dynamics underpinning their water use behaviour. Behailu et al. (2016) further point out that if community members were not included in the creation of modern approaches, or if their social and cultural components were misinterpreted or ignored, they would be reluctant to work with those systems. Hence, to get traditional people to become real participators rather than observers in conservation, it will be vital to blend the modern approaches with traditional knowledge that already exists (Behailu et al., 2016).

Gondo and Kolawole (2017) also add that the ways of living of indigenous people and their knowledge systems shape their attitudes and values towards the environment, thus guiding their behaviours about their environment. Additionally, Kapfudzaruwa and Sowman (2009) state that communities also utilise their indigenous knowledge systems (IKS) to manage and conserve natural resources, transferring information through oral tradition from generation to generation. For instance, for the Akan tribe of Ghana traditional leaders utilised taboos to manage the use of environmental resources ethically in the past. There were taboos to prevent the use of metal implements in lakes and rivers (water sources) and clay pots; rather than metal ware, were used to fetch water. Metallic elements in rivers were believed to have the potential to kill fish resulting in possible sickness or deaths of individuals who consume those fish. It was also prohibited to wash clothes in streams to avoid water contamination because it was believed that there were locally produced soaps with strong chemicals posing a danger to humans and marine life (Adu-Gyamfi, 2011).

Gondo and Kolawole (2017) also state that in rural Zimbabwe, various traditional strategies cherished in IKS are used to conserve water. Amongst many other strategies such as *zviera* (taboos) and *mitupo* (totemism) and the encouraging the views of the water as a shared property. The totems are not only sanctions to correct behaviour but are also meant to teach members of society how they should conduct themselves towards the water and other aquatic resources. What is suggested here is that most indigenous people already have their existing traditional strategies to encourage or discourage certain water consumption behaviours. Thus, Behailu et al. (2016) agreed that these teachings and beliefs of traditional institutions have an influence on water management and can define how a sustainable environment can be achieved via their informal norms and limitations.

Customary water management structures, particularly in rural areas, are vital to the management of water at a grassroots level, as discussed in section 2.5.3.5 (Malzbender et al., 2005). This is because, in most African countries, surface water bodies are regarded as public goods and common property resources. This means that community members are entitled to equal rights, access, and use of the water, and the whole community is involved in the conservation and maintenance of water quality (Kohler, 2016; Olokesusi, 2006). Kapfudzaruwa and Sowman (2009) indicate that historically, in South Africa, the management of water resources in rural communities was mostly the responsibility of traditional and customary leaders. For example, the community of Tshikombane in the Vhembe district (South Africa), erected a water supply infrastructure that they financed and are regulating themselves to make sure there is consistent water supply in the community. The system is managed by the local traditional leader who is also responsible to resolve water-related conflicts, as well as for the distribution, administration, and control of water resources in the village (Malzbender et al., 2005).

Intercultural dialogues should be conducted and water management practices or strategies should be adapted to specific cultures when raising awareness and promoting and developing educational tools (Kohler, 2016). Indigenous knowledge holders should help in finding solutions to water-related concerns because cultural diversity can contribute to sustainable practices and approaches (Orbach et al., 2011; UNESCO, 2002). Once more, it is evident that there is a need for a multidisciplinary

and intercultural approach to sustainable water conservation in communities. Water management and conservation interventions may need to be adopted for specific cultures in consultation with relevant traditional leaders and indigenous knowledge holders. This may encourage involvement and commitment from communities to engage in water conservation efforts.

2.7 Concluding remarks

This chapter offered insight into water scarcity and conservation. The global prevalence of water scarcity was presented in the initial part of the chapter. Subsequently, the effects, causes, and coping strategies for water scarcity were also discussed. The uses of water and legal frameworks for water management were discussed. Notably, the significant role psychology plays in water conservation efforts was illuminated. Psychological constructs such as attitude, knowledge, perceptions, beliefs, habits, and experiences are important to influence pro-environmental behaviours in communities. Factors that affect and influence water conservation on an individual, institutional, and community level were presented in this chapter. The next chapter discusses the role of theory in water conservation.

CHAPTER 3: THEORETICAL PERSPECTIVES ON WATER CONSERVATION

3.1 Introduction

This chapter presents several theories that have sought to explain conservation and pro-environmental behaviour. The theory of reasoned action will be discussed initially, followed by the Theory of Planned Behaviour and Norm Activation Theory. Subsequently, Cognitive Dissonance and Social Cognitive theories are outlined. Lastly, the Value-Belief-Norm Theory and Afrocentric approach will be presented and critiqued as the theoretical frameworks of the present study.

3.2 Theoretical Perspectives on Conservation and pro-environmental behaviour

3.2.1 Theory of Reasoned Action (TRA)

Ajzen and Fishbein's (1980) developed the Theory of Reasoned Action (TRA). TRA aims to explain human behaviour based on their intentions to adopt certain behaviour and people's intentions are considered antecedents of their actual behaviour. One of the key tenets of TRA is that people act rationally to attain positive outcomes and avoid disappointing others by confounding their expectations (Macovei, 2011). Within the TRA theory, behavioural intention determines actual behaviour and is comprised of two variables, namely, attitudes which refer to a positive or negative evaluation of executing a behaviour, as well as subjective norms (perceived influences that others may have). In addition, this theory also provides a decent explanation for why under some conditions people show behaviour that is not consistent with their attitude, for example, when the subjective norm component weighs more heavily (Marandu et al., 2010).

TRA further proposes that attitude is considered one of the two antecedent components that control intention which then determines behaviour, but not directly determining behaviour. This shows that a rise in attitude and subjective norms could lead to a stronger desire to engage in the behaviour (Macovei, 2011; Marandu et al., 2010; Nguyen et al., 2018). Additionally, Beedell and Rehman (2000) explain that TRA looks beyond measures of attitude and subjective norms to examine why people hold the attitudes and norms that they do. This involves studying and measuring people's beliefs. In this approach, Marandu et al (2010) pointed out the assumption that a

person who firmly believes that conserving water is effective has higher chance to conserve water persistently. Thus, both an individual's attitude towards the behaviour and subjective norms influence whether an individual is likely to carry out that behaviour. A study conducted by Marandu et al. (2010) investigated the power of the TRA in explaining the conservation of residential water use in Botswana. They found that the two constructs of TRA (attitudes and norms) were significant predictors of water conservation behaviour amongst residents. Consequently, Marandu et al. (2010) recommended that water conservation communication messages and interventions should aim at changing attitudes and norms. In contrast, Marandu et al. (2000) point out a growing recognition that applying TRA in the environmental field introduces a level of complication. This is because the community reaps the advantages of behaviour change rather than the individual making the change, there is less motivation for individual behavioural change.

3.2.2 Theory of Planned Behaviour (TPB)

The theory of Planned Behaviour (TPB) was introduced by Icek Ajzen in 1985. This theory was developed from the Theory of Reasoned Action by adding a new variable called "perceived behavioural control". Perceived behavioural control refers to the perceived ease or difficulty of adopting a certain behaviour, and it is influenced by both previous experience and predicted obstructions or difficulties. Additionally, St John et al. (2010, p. 660) explain that "perceived behavioural control is a function of the presence (or absence) of resources (including skills and material items) that facilitate performing the behaviour, and the perceived power that each resource has to facilitate the behaviour".

TPB assumes that behaviour can be determined by various factors such as the individual's beliefs and evaluations of the likely outcomes of the behaviour, the normative expectations of significant others, motivation to comply with these expectations, and the individual's perceived ability to control the behaviour (Macovei, 2015; Lee & Tanusia, 2016). Pronello and Gaborieau (2018, p. 9) state that TBP posits six constructs to indicate a person's actual control over behaviour, namely; "three types of beliefs (behavioural, normative, and control), attitudes, subjective norms, and perceived behavioural control". The predictors of behaviour are

behavioural intentions, which in turn are influenced by (a) the extent to which an individual holds a favourable attitude toward the behaviour, (b) the individual's perceptions of the norms and conventions regarding the behaviour (i.e., subjective norms), and (c) the extent to which the individual perceives the behaviour at hand to be under his or her control (i.e. perceived behavioural control) (Cameron, Ginsburg, Westhoff & Mendez, 2012; Sawitria, Hadiyantob & Hadic, 2015). Thus, a stronger intention to perform a specific behaviour corresponds to a greater likelihood that the behaviour will be performed (Chaudhary et al., 2017).

The theory of Planned Behaviour is one of the models most frequently used in the literature to explore pro-environmental behaviour including recycling, travel mode choice, energy consumption, water conservation, and food choice. The application of this theory could encourage community members' positive environmental habits, attitudes, and knowledge, as well as guide people's environmental actions (Stern, 2000; Joachim et al., 2015). Various studies were conducted about TPB in the environmental field. For instance, Lee and Tanusia (2016) conducted a study to examine the influence of attitudes toward energy conservation among university students using the TPB. They discovered that education about energy is crucial for fostering an optimistic attitude toward the conservation of energy. As a result, they recommended that institution facilities managers develop relevant legislation to instil the proper attitudes and behaviours toward energy conservation.

Chaudhary et al. (2017) also conducted a survey study assessing residents' landscape water conservation behavioural intentions using TPB constructs including attitudes, subjective norms, and perceived behavioural control. The findings of the study showed that excluding attitude, the TPB core variables (subjective norms and perceived behavioural control) significantly predicted intentions to conserve water. This suggested that although residents have positive water conservation attitudes overall, the effect of the attitude variable on intent is not significant. Additionally, Po, Kaercher, and Nancarrow (2003) conducted a literature review on factors influencing public perceptions of water use and found that TPB has been utilised successfully in the previous decades to analyse conservation behaviour (such as water conservation) and to create successful conservation.

Po et al. (2003) concluded that the application of TPB proposes that people's willingness to use recycled water (behavioural intention) is influenced by their attitudes towards using the water; their perception of what their significant others think about using recycled water (subjective norm) and their perceived ease or difficulty in using recycled water (perceived control). Moreover, Khumalo (2013) found that in Bulawayo (Zimbabwe), residents will practice water conservation if they think that controlling their water usage is simple and straightforward. Residents will also have the willpower and commitment to demonstrate water-saving behaviours if the idea of attitude, subjective norm, and perceived behaviour control is favourable. It is apparent that TPB has been widely studied and reviewed and it is thought to contribute greatly to the environmental field. Nevertheless, Ajzen (1991) advises that the predictive power of attitudes, subjective norms, and perceived behavioural control on behavioural intentions varies across different situations and behaviours. Thus, it is important to explore these factors relative to the specific contexts.

3.2.3 Norm Activation Theory (NAT)

The Norm Activation Theory (NAT) was developed by Schwartz (1977) and is based on the altruism or prosocial paradigm (Kiatkawsin, Sutherland & Lee, 2020). NAT posits that behaviour is influenced by personal norms, which are determined by various factors such as the awareness of the problem, its consequences, as well as the attribution of responsibility (Coulibaly, Du, Diakité, Abban, & Kouakou, 2021). Harland, Staats, and Wilke (2007) describe the NAT as a moral approach and that pro-environmental behaviour is likely to be carried out if people feel morally obligated to carry out the behaviour. This means that if a person is aware that certain behaviours cause certain problems, the awareness is followed by the reflection of ones' contribution to those problems and whether they are capable of solving such challenges (Liu, Sheng, Mundorf, Redding & Ye, 2017).

Harland et al. (2007) state that norm activation refers to a process in which people construct personal norms, that is, self-expectations regarding prosocial behaviour which are experienced as feelings of moral obligation. This process is assumed to be influenced by four situational activators and two personality trait activators. The first activator is *awareness of need* which involves the extent to which a person's attention

is focused on the existence of a person or a more abstract entity in need (for example, the environment). The second activator *situational responsibility* refers to how much a person believes he or she is accountable for (the consequences of) that need (Harland et al., 2007; Kiatkawsin et al., 2020; Macovei, 2015). The third activator is *efficacy*, which refers to the degree to which acts and behaviours that could help to ease the need have been identified. The fourth activator is the *ability* and it refers person's perception of the availability of the resources or competencies needed to carry out the behaviour. The activators of personality traits are *awareness of consequences* which refers to an individual's ability to be open to environmental cues of need and how well one comprehends the link between one's actions and the potential environmental effects. The second personality trait activator is a *denial of responsibility*, which refers to people's tendency to absolve themselves of responsibility for the implications of their actions on the welfare of others (Harland et al., 2007; Kiatkawsin et al., 2020; Macovei, 2015).

Kiatkawsin et al. (2020) state that because of the popular notion that the environment is a collective resource that everyone has a responsibility to care for, altruism or pro-social motives are considered primary drivers of behaviour that are favourable to the environment. According to Liu et al. (2017), NAM assumes that the degree of an individual's responsibility for pro-environmental behaviour is reflected in personal norms, and depending on the consistency between the behaviour and personal norm, the person may develop a sense of pride or guilt. Coulibaly et al. (2021) are of the view that there is no external pressure that pushes the individual to adopt the target behaviour, instead, it is the internal coherence between actions and values or convictions.

3.2.4 Cognitive Dissonance Theory

Cognitive dissonance theory, originally formulated by Festinger (1957), proposes that people experience a negative affective state, called cognitive dissonance when they simultaneously hold two psychologically inconsistent cognitions. This awakening of dissonance encourages people to change their thinking or their behaviour to alleviate their suffering. (Odou, Darke & Voisin, 2018; Rashid & Mohammad, 2012; Vining, 2002). Gosnell (2017) states that generally, Individuals seek consistency,

competence, and morality in their self-perceptions, therefore acting in a way that contradicts these characteristics causes psychological pain (dissonance), which can be costly morally. The dissonance or tension is processed almost the same way the brain processes physical pain; instinctively, there is a need to reduce this psychological tension. Hence, the Cognitive dissonance theory's view is that people want to be consistent in their attitudes, beliefs, words, and behaviours and cannot tolerate inconsistencies and will work to eliminate or reduce them whenever it exists. The process of reducing the dissonance or tension is generally termed rationalisation, that is, one automatically changes, dismisses, or adds cognitions that reduce the tension. (McGuire, 2015; Ertz & Sarigöllü, 2019; Rashid & Mohammad, 2012).

McGuire (2015) explains that cognitive dissonance is not only reactive, but can also be proactive, for example, the longer this process operates on cognition or if the threat is in a domain with which the individual strongly identifies, he or she may internalize these inaccuracies as strongly held attitudes, beliefs, and values, influencing behaviour and judgment in following instances. Additionally, Odou et al. (2018) indicate that only if the incongruence between at least two cognitions poses a threat to the self does cognitive dissonance have an effect, resulting in people being motivated to adopt generally altruistic behaviours to decrease the contradiction between the identified behaviours that are not compliant and the relevant social norm. Moreover, Vining (2002) indicates that the degree of dissonance will naturally vary depending on the importance of your belief, attitude, or value, as well as the degree of discrepancy between your actions and your beliefs. This suggests that the greater the dissonance the more you will be motivated to resolve it.

Cognitive dissonance theory proposes that "dissonance can be reduced in three ways: by transforming an existing cognition (attitudinal change), by adding consistent cognitions (behavioural change) or by reducing the importance of the inconsistency (trivialisation)" (Odou et al., 2018, p. 4). Similarly, Rashid and Mohammad (2012) propose that one can reduce the dissonance through the following: a) altering one of the thoughts so that it is no longer in discord with the other, b) reconsidering other cognitions that are consistent with or compatible with one of the dissonant conceptions, c) adjusting the prominence of one of the discrepant cognitions.

Ertz and Sarigöllü (2019) discuss the application of Cognitive Dissonance theory in environmental matters. They indicate that there is a possibility that people who simultaneously show low levels of pro-environmental behaviour (PEB) and high positive PEB attitudes can experience discomfort. People then rationalise their clashing attitudinal behaviour through cognitive restructuring or behaviour modification which involves changing one's beliefs or attitudes about the behaviour or modifying their behaviour. This results in the alterations of individuals' assessments of both the likelihood and desirability of the behaviour's consequences, resulting in a change in attitudes (Erzt & Sarigöllü, 2019). Similarly, Vining (2002) explains that if our attitudes are pro-environmental but we do not perform conservation actions, a dissonant state is created with accompanying negative emotions. One way to resolve this dissonance and relieve the negative emotion is to find a way to act following our attitudes, that is, perform a conservation action.

3.2.5 Social Cognitive Theory

Social Cognitive Theory was developed by Albert Bandura (1991) and it highlights the capacity of individuals to intentionally choose, execute, and manage their actions to actualise expected outcomes. This theory proposes that learning occurs in a social context with a reciprocal triadic relationship between an individual, environment and behavioural variables in influencing the pro-environmental behaviour process (Graf et al., 2012; Pronello & Gaborieau, 2018; Sawitria et al., 2015). Pronello and Gaborieau (2018) further stated that the Social Cognitive theory rejects the assumption that behaviour is guided by a stimuli-response phenomenon, causing people to act automatically, but rather individuals are considered as agents relating among themselves with expectations about the future, being impacted by environmental concerns and driven to self-reinforcement and adaptive behaviour.

The social cognitive theory recognises how environments shape behaviour, but also looks at a person's capacity to interact with their environment by altering and constructing environments to suit their purposes (Graf et al., 2012). Another key influencing aspect of behaviour, according to Social Cognitive theory, is people's self-efficacy, or belief in their ability to achieve a goal. People learn by doing and observing others and they can alter reality. Additionally, the goal, expected outcome, and self-

efficacy can all predict behaviour (Pronello & Gaborieau, 2018). Pajares (2002) explained that environments and social systems influence human behaviour through the psychological mechanisms of the self-system. Therefore, social cognitive theory suggests that factors such as economic conditions, socioeconomic status, and educational and familial structures do not affect human behaviour directly, instead, they affect it to the degree that they influence people's aspirations, self-efficacy beliefs, personal standards, emotional states, and other self-regulatory influences. For matters relating to environmental behaviour, Sawitria et al. (2015) argue that people with contextual factors that are conducive and strong environmental self-efficacy assessments would have higher outcome hopes and participate in more pro-environmental behaviour than those with lower regard for their efficacy to carry out such activities. However, Sawitria et al. (2015) also point out that the use of a Social Cognitive theory to explain and understand pro-environmental behaviour is scarce.

3.3 Theoretical Framework of the current study

In the present study, the researcher adopted the Value-Belief-Norm Theory (VBN) and Afrocentric paradigm as lenses through which the perceptions of community members in Lephalale, regarding water conservation were understood and viewed. Below is the discussion of the core ideas and assumptions of the VBN and Afrocentric paradigm, including the implications of both frameworks, for the current study.

3.3.1 Value-Belief-Norm Theory

The Value-Belief-Norm (VBN) theory was first established by Stern and his colleagues (1999) to explain the impact of human values on behaviour in the conservation context (Stern, Dietz, Abel, Guagnano & Kalof, 1999). VBN extends Schwartz's (1977) norm-activation theory and the New Ecological Paradigm by van Liere and Dunlap (1978) which proposed that the environmental changes are linked to a view, general beliefs, and concerns (Ecological worldview) that human actions have adverse effects on the environment (Bruins, 2011). The main assumption is that there is a casual chain relationship between values, beliefs, norms, and behaviours. This theory recognises that attitudinal factors, consisting of values, beliefs, and norms, have a causal relationship with environmental behaviours. Thus, values influence pro-environmental behaviour through pro-environmental beliefs and personal norms (Ghazali, Nguyen,

Mutum & Yap, 2019; Hiratsuka & Steg, 2018; Liu, 2019). Furthermore, this chain of variables also includes specific beliefs about the negative consequences of certain actions and the individuals' ability and responsibility to avert these negative consequences, thus activating sustainable personal norms for behaviour (Lind, Nordfjaern, Jorgensen & Rundmo, 2015).

VBN model emphasises the influential role of values informing personal environmental attitudes, moral norms, the consciousness of the implications of one's actions, taking responsibility for one's actions, and contributing to pro-environmental (Poskus, 2015). Values are guiding principles for any behaviour and searching and evaluating the information on which one's own beliefs are based (Lai, Tiroto, Pagliaro & Fornara, 2020; Liu, 2019). Similarly, Stern, Dietz, and Guagnano (1995, p. 726) explain that "values and worldview act as filters for new information and ideas. Information congruent with an individual's values and worldview will be more likely to influence beliefs and attitude." Therefore, when an individual holds long-lasting beliefs and ideals that are important to preserving the environment, pro-environmental sentiments lead to personal norms for such individuals (Ghazali et al., 2019; Minelgaité & Liobikienė, 2021).

Chen (2014) indicates that there are three types of value orientation identified within the VBN theory, namely: egoistic, altruistic, and biospheric values. Egoistic values refer to self-interest concerning society and the focus is on one's welfare. Altruistic values are collective concerning the welfare of other people and living species whilst biospheric values emphasise concern about the biosphere, the environment, and the ecosystem (Ghazali et al., 2019). These value positioning have an impact on how people form their ideas and worldviews in the face of negative environmental outcomes. This worldview explains an awareness of consequences for acting in a certain manner, thus, contributing to the acceptance of responsibility (that is, increasing the likelihood that a person will feel morally obliged to act favourably) (Chen, 2014; Denley et al., 2020).

Liu (2019, para. 2) reports that within the VBN theory, beliefs refer "to one's thoughts about the natural environment and human behaviour, and comprise two components namely; awareness of consequences and ascription of responsibility." Awareness of

consequences is the belief that environmental circumstances can either benefit or threaten other people, species, or the ecosystem. Ascription of responsibility refers to the belief that an individual's actions can either prevent or promote potentially undesirable consequences (Liu, 2019). Additionally, Lai et al. (2020) argue that the degree of environmental concern influences the extent to which information about the environmental consequences of a behaviour is pursued and shaped into beliefs. People's awareness of the behavioural consequence depends on their ecological worldview subsequently determining their self-ascribed responsibility to act, which then leads to a person's sense of obligation to act (personal norms) (Kaiser, Hübner, & Bogner, 2005).

Personal norms, on the other hand, refer to the attitudinal factor related to the actual behaviours influenced by people's beliefs, ideas, and sentiments about the importance of protecting the environment. These are feelings of moral obligation leading to the willingness to act pro-environmentally that people experience (Liu, 2019). Valizadeh et al. (2018) indicate that personal moral norms toward water conservation are activated when individuals are aware of the negative consequences of water shortage (awareness of consequences).

As discussed above and in section 2.5.2.2, people's attitudes, views, and beliefs are closely linked to their behaviours, hence the VBN theory is considered relevant to the current study. If one holds positive values and concern for the environment or beliefs, the greater chances of them carrying out pro-environmental behaviours, and vice versa. Accordingly, the present study focused on exploring the perceptions (worldviews, beliefs) of participants regarding water conservation to develop a model for water conservation considering these perceptions, beliefs, and values.

3.3.1.1 Critique of the Value-Belief-Norm Theory

VBN has been widely researched by various scholars. Despite this, the theory has not been without critique. For instance, Liu (2019) argues that although the VBN model describes the important structure of pro-environmental behaviours, more variables could influence peoples' decisions toward the environment. Additionally, Schultz (2001) critiques the three-way breakdown of values employed in the VBN theory indicating that there is a lack of evidence indicating three distinct value orientations.

This is because, attitudes are frequently associated with a variety of values, and even more contradictory, values and distinct value orientations do not necessitate distinct attitudes (Schultz, 2001). Bruins (2011) further points out that VBN has some shortcomings when predicting pro-environmental behaviour because it does not take emotions (which could trigger obligations) into account.

Kaiser et al. (2005) argue that people's ecological worldview is inadequately integrated into the VBN model. More specifically, the influence of ecological worldview on self-ascribed responsibility, personal norms, and conservation behaviour is insufficiently covered. Moreover, Kirby (2021) indicates that subjective norms were excluded from VBN because the authors suggested that environmental behaviours went against social norms. However, subjective norms may encourage environmental behaviours and should be considered since most individuals in the United States now support many environmental behaviours.

3.3.2 Afrocentric paradigm

The Value-Belief-Norm theory is a more Western perspective; thus, the Afrocentric paradigm was used in conjunction with VBN to preserve African values, morals, and beliefs and empower the African ways of knowing (Asante, 1990; Asante, 1995). Furthermore, as discussed in section 2.6.1, culture and indigenous knowledge systems are important in water management, thus, the Afrocentric paradigm was also considered to be relevant to the current study. For Asante and Mazama (2005) the Afrocentric paradigm is not an anti-European view, but an interpretation and reinterpretation of reality from an African perspective. Similarly, Chawane (2016) states that Afrocentrists believe that Africans can form their truth to suit their own political and social purposes, hence Afrocentricity should take its place alongside other cultural and historical perspectives. Moreover, Afrocentricity not only generates new orientations toward interpreting data but ultimately employs research that is fruitful and liberating for African people (Pellerin, 2012). According to Mazama (2003, p.5), Afrocentricity is defined as a paradigm that functions intentionally inside African ways of knowing and being, resulting in the application of principles, methods, concepts, and ideas developed from our own Africana cultural experiences. Thus, "one arrives at an understanding and rapprochement by accepting the agency of the African person

as the basic unit of analysis of social situations involving African-descended people” (Asante, 2000, p.50). Additionally, the Afrocentric research centres the question on the lived experience of the African peoples and views the researched phenomenon not only from a contemporary perspective but from a historical perspective as well (Davis, Williams & Akinyela, 2010).

Chawane (2016) states that Afrocentricity strives to reinstate Africans as agents in human history and is multicultural allowing other cultures to view history from their perspective. According to Asante and Mazama (2005), the Afrocentric paradigm emphasizes the centralization of African principles in any analysis of African culture and behaviour, as well as asking crucial cultural questions in categories such as location, place, and stance. Moreover, Afrocentricity advocated for change in the manner that the world has been perceived to incorporate complete attributes of human existence, with calls for a change in the way that the world has been viewed, a change that should encompass all attributes of human existence, with African experiences being at the centre (Chawane, 2016). Pellerin (2012) adds that conceptualisation within Afrocentric research methodologies fosters the application of the culturally attuned meaning of the concepts used in the study.

Mazama (2003) identified seven criteria for the development of an Afrocentric research methodology; namely: “1) The African experience must guide and inform all inquiry; 2) The spiritual is important and must be given its due place; 3) Immersion in the subject is necessary; 4) holism is a must; 5) Intuition is a valid source of information; 6) Not everything that matters are measurable; and 7) Knowledge generated must be liberating” (Mazama, 2003, p. 399). In addition, Afrocentric research methodologies, particularly in exploratory research, involves investigating Africana phenomenon to develop a culturally accurate and intimate understanding of Africana reality. Whilst using the Afrocentric paradigm, in addition to describing an African phenomenon, it is anticipated that researchers will provide descriptions and explanations of the studied phenomenon that are culturally rich (Pellerin, 2012).

The Afrocentric theory was regarded as a theoretical framework suitable for the present study because African people were the centre of the study. The experience of African people, knowledge, and ways of doing things guided the research processes;

thus, a culturally accurate psychological model was developed from the participants' stories. Furthermore, the culture, behaviour, and spiritual elements of the African people in inquiry were acknowledged in the present study.

3.3.2.1 Critique of Afrocentric Paradigm

The Afrocentric paradigm has also been subjected to critique from various scholars. Ebede-Ndi (2016) argues that the challenge with Afrocentrism is that it is generally defined as the study of African peoples using an Africa-centred lens; placing Africa at the centre of any analysis of African history and culture, including the African American experience. Thus, merging the African and African American experiences could present some methodological challenges. Additionally, Chawane (2016) indicates that some opponents of Afrocentrism object to its Africanised approach to knowledge, preferring what they regard as an approach to knowledge that is universal. Moreover, the main challenge with the historical literature of the Afrocentric approach is the bid to separate the duality of black Americans to augment one feature of identity (African) whilst denying another (American) and construct one identity for Diaspora blacks, regardless of where they are from, and ignore their diverse, varied, and intricate historical and cultural experiences (Adeleke, 2015).

Other critics argue that numerous findings in the discipline are reached in a non-academic manner, considering that many Afrocentrists have degrees in other fields other than African studies (Chawane, 2016). Moreover, Afrocentricity is attacked for recommending the adoption of Swahili as the Afrocentric language. This creates a challenge as there are multitudes of languages in Africa and communities that were moved to America in the era of intercontinental trading of slaves who could not speak nor had the knowledge of the language (Chawane, 2016).

3.4 Concluding remarks

Various theories that explain pro-environmental behaviour, conservation, and the related processes were presented in this chapter. Theories such as the Theory of Reasoned Action, Theory of Planned Behaviour, Norm Activation Theory, Cognitive Dissonance Theory, and Social Cognitive theory were discussed in this chapter. Furthermore, this chapter presented the Value-Belief-Norm and Afrocentric theories

as the theoretical frameworks from which the researcher viewed the perceptions of community members regarding water conservation in the present study. The following chapter presents the research methodology for the present study.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

The purpose of this chapter is to provide a detailed discussion of the methodology employed in this study. The chapter will provide a discussion of the qualitative research approach that was adopted for the present study. The advantages and disadvantages of this method, as well as the rationale for choosing it, are discussed. The chapter will also provide a discussion regarding the study setting and the sampling methods that were followed. The discussion on data collection and analysis describes how codes and categories emerged. The final section of the chapter focuses on the study's ethical considerations.

4.2 The philosophical underpinnings of qualitative and quantitative research methods

Research philosophy refers to a structure of beliefs and assumptions concerning the generation of knowledge. These include assumptions about human knowledge, the realities the researcher encounters whilst conducting the research, and the extent and ways the researcher's values influence the research process (Saunders, 2009). The terms, quantitative and qualitative *are* often used to describe two different world views or paradigms for research. The major difference between these approaches is not in the type of data collected but in the foundational assumptions from philosophical positions (Willis, Jost & Nilakanta, 2007). Quantitative research designs are generally associated with positivism whilst qualitative research is often associated with an interpretive philosophy (Kirono & Odoyo, 2020; Saunders, 2009; Willis et al., 2007).

4.2.1 Positivism

Positivism relates to the philosophical stance of the natural scientist and represented the belief in logically ordered and law-like generalisations at the end. Positivism asserts that research methods resemble those used to study chemistry and physics may be applied to examine human behaviour. This philosophy defines a worldview to research, which is grounded in what is known in research methods as the scientific method of investigation (Saunders, 2009; Willis et al., 2007; Kivunja & Kuyini, 2017).

The positivists focus on a strictly scientific empiricist method designed to yield pure data and facts uninfluenced by human interpretation or bias. An extreme positivist position views organisations and other social entities in the same manner as physical objects (Saunders, 2009; Willis et al., 2007).

A positivist researcher might use existing theories to develop hypotheses. These hypotheses would be tested, confirmed, or refuted using standardized instruments and controls usually generating quantitative data. Positivists also try to remain neutral and detached from their research and data to avoid influencing the findings and may undertake research, as far as possible, in a value-free way (Gill & Johnson, 2010; Saunders, 2009). The research set in this paradigm is used to explore the cause-and-effect connections in nature and is likely to use highly structured research methods. Research relies on deductive logic, formulation of hypotheses, testing those hypotheses, offering operational definitions and mathematical equations, and calculations to derive conclusions (Kivunja & Kuyini, 2017; Saunders, 2009).

4.2.2 Interpretivism

Interpretivism was developed as a critique of positivism. Interpretivism is a subjectivist philosophy, which emphasises that human beings are different from physical phenomena because they create meanings. Interpretivism studies meanings to create new, richer understandings of organisational realities (Saunders, 2009). For interpretivists, individuals' lived experiences and meanings are important to the research. Reality is socially constructed, subjective, and could be perceived in different ways by different people. Interpretivism makes a concerted effort to comprehend the observed subject's viewpoint. This is why this paradigm has also been referred to as the Constructivist paradigm (Kivunga & Kuyini, 2017; Morgan, 2007; Saunders, 2009; Willis et al., 2007). Interpretivism is favourable to qualitative approaches such as case studies, interviews, and observation as these methods are superior for understanding how humans interpret the world around them (Willis et al., 2007).

The researcher makes sense of their findings by thinking about them and processing them cognitively, based on their interactions with participants. Interpretivist research is subjective and focuses on complex, in-depth, multiple interpretations and meanings

attached by research participants. An interpretive recognise that their interpretation of research materials and data, as well as their values and beliefs, play an important role in the research process (Kivunja & Kuyini, 2007; Saunders, 2009). It is for these assumptions and stances presented above that the researcher adopted the interpretive/constructivist approach for the present study. The present study aims to explore the perceptions of community members in the Lephalale community regarding water conservation.

4.2.3 Rationale for the Adoption of qualitative research approach

The researcher outlined the fundamental premises of both qualitative and quantitative research methodologies in the previous section. Since the present study sought to explore the participants' perceptions of water conservation to develop a psychological model to address the issue of water conservation, the qualitative research approach was considered most appropriate. The qualitative research approach allowed the researcher to obtain an in-depth understanding the thoughts and experiences of the participants, as well as investigate their inner experiences and how meanings are generated and modified; as suggested by Corbin and Strauss (2015).

Furthermore, qualitative approaches explore attitudes, behaviour, and the meanings people ascribe to a social or human problem, as well as the experiences of participants through methods such as interviews (Dawson, 2009; Creswell & Creswell, 2018). This is in line with the aim of the study which was to explore how participants' perceptions regarding the issue of water conservation taking into consideration their belief systems, attitudes, behaviour, and contextual factors which are considered essential determinants of water conservation behaviour (Russell & Fielding, 2010; St John et al., 2010).

4.3 Research design

Research design is referred to as a master plan, blueprint, and even as a sequence of research tasks and activities. It is the plan of how the researcher plans to go about answering the research question(s) and contains clear objectives, identifies the sources from which data will be collected, and method of data collection and analysis

(Shukla, 2010; Saunders, Lewis & Thornhill, 2019). For this study, an exploratory research design was employed. An exploratory study aims to ask open questions to discover what is happening and gain insights into a topic of interest. Exploratory research consists of an attempt to discover new and interesting sometimes to explore an existing topic to produce new hypotheses and ideas. Exploratory research aims to define problems, clarify concepts, and generate hypotheses. (Saunders et al., 2019; Sue & Ritter, 2007; Swedberg, 2018). Exploratory research has various advantages such as that it is flexible and adaptable to change. There is time to build greater rapport, allowing access to covert information and the motives of participants. Researchers conducting exploratory research must be willing to shift course as new data and insights emerge during their investigation (Gill & Johnson, 2010; Saunders et al., 2019).

Exploratory research can be done in a variety of ways, including doing a literature search, interviewing subject experts, conducting in-depth individual interviews, conducting focus group interviews, or using projective techniques. Exploratory research should be undertaken in an open, honest, and self-critical manner (Saunders et al., 2019; Shukla, 2010; Reiter, 2017). Furthermore, Reiter (2017) indicated that exploratory research tries to apply fresh explanations, ideas, techniques, angles, and hypotheses to reality in the hopes of providing new perspectives on various phenomena. The present study aimed at exploring the perceptions of community members in Lephalale regarding water conservation.

4.4 Setting

The researcher elected to conduct the study in the area of Ga-Seleka, one of the rural tribal settlements outside Lephalale town (See Figure 1). According to Lephalale Local Municipality [LLM] (2017), the municipality was recently identified as a national point of interest in the new National Development Plan, 2030 due to the rapid and anticipated growth as a result of mining and other associated projects. Furthermore, Lephalale was declared by the national minister of DWA as a significant area regarding water scarcity because one-third of households in the area do not have access to water in the dwelling or yard but must make use of community standpipes (Lephalale Integrated Development Plan [IDP], 2014-2016). According to Taylor (2017), roughly

22.5% of the rural communities in Lephalale have access to water within a walking distance of 200m, whilst for 20.5% of the residents, water is 200m or beyond. This suggests that 35.6% of rural residents do not have water that meets the standard of the Reconstruction and Development Program (RDP) and that the maximum distance from a point of use should be 200m. Due to sometimes extremely high weather temperatures in Lephalale, the area has become vulnerable to weather events such as flooding and drier weather events such as drought and wildfires (ERM, 2017). It is for these reasons that the researcher elected to conduct the study in Lephalale municipality as it is one of the places highly affected by water scarcity.

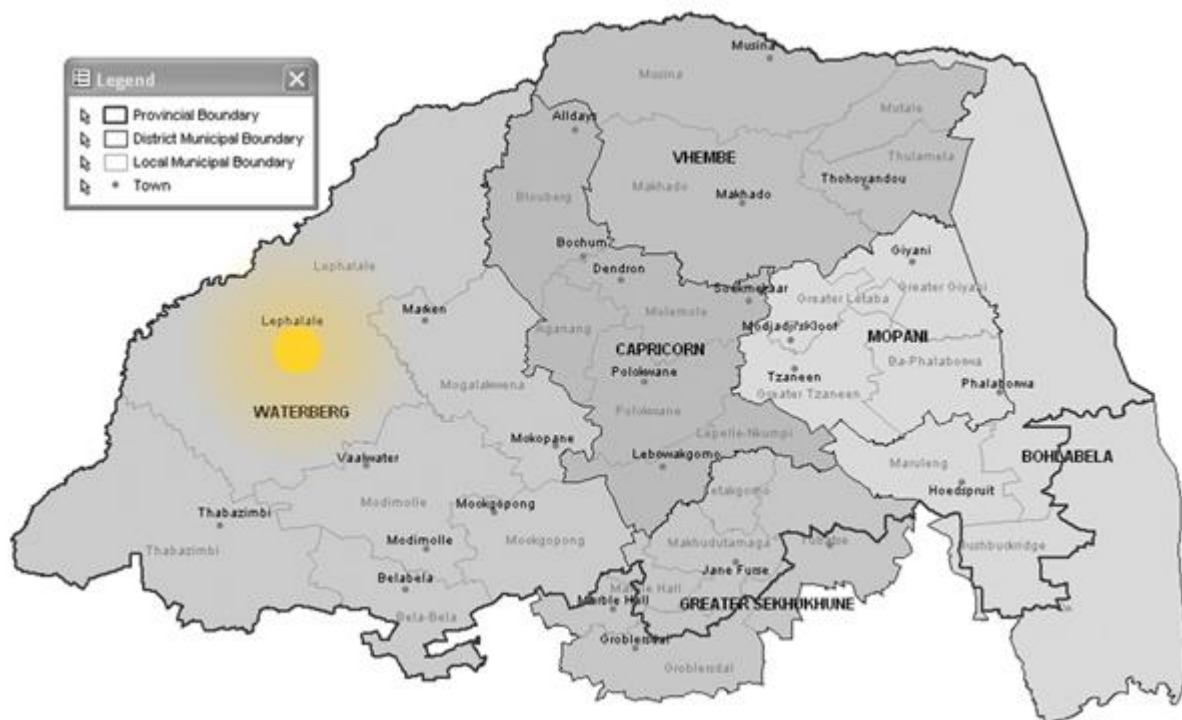


Fig 1: Map of Limpopo Province in South Africa showing the location of Lephalale municipality (Mathaulula, Francis & Mwale, 2015)

Lephalale (Formerly known as Ellisras) is a coal mining town in the Limpopo province of South Africa immediately east of the Waterberg Coalfield. The town was established as Ellisras in 1960 and named after the original farm owners, Patrick Ellis and Piet Erasmus. In 2002, Ellisras was renamed Lephalale (Setswana, 'to flow') by the provincial government of Limpopo, after the main river that crosses the municipality. Lephalale Local Municipality (LLM) is one of the largest municipalities in Limpopo province consisting of 12 wards. Most settlements in these wards are lower-income

settlements of rural areas, except the towns of Lephalale, Overwatch, and Marapong. The rural tribal settlements, which are situated on tribal land, are about 40-70km East and northeast of Lephalale town. Ga-Seleka village is one of these rural tribal settlements under the leadership of *Kgosi Seleka* (LLM, 2017; Mocwagae & Cloete, 2019; Taylor, 2017).

4.5 Population and Sampling

Participants for the present study were selected through purposeful sampling. Babbie (2014) described purposive sampling as the process of selecting a sample based on the researcher's judgment about which participants will be the most useful or representative and possess the most relevant knowledge regarding the studied phenomenon. Purposeful sampling aims to purposefully identify participants or sites that will best help the researcher understand the problem and the research question (Creswell & Creswell, 2018). Gill and Johnson (2010) indicated that exploratory research allows researchers to strategically select a sample based on their judgment regarding the population of interest with a particular aim in mind.

For this study, it was envisaged that about 20 participants would be sampled. It was initially proposed that the participants would be people who have municipal taps (with running water) in their yards. However, after consultation with the Seleka tribal council and as well as following the principles of theoretical sampling in qualitative research, it was discovered that most community members relies on community standpipes (communal taps) to get access to water as reported by Lephalale Integrated Development Plan [IDP] (2014-2016) above. In qualitative research projects, the evolving theoretical understanding of the subject directs the sampling in certain directions and the sampling of subjects may be redirected. This process is known as theoretical sampling (Babbie, 2014).

Participants were people who relied on communal taps the most for access to water within the confinements of the Ga-Seleka area. Twenty (20) participants were continually selected until the saturation of the theory. Saturation means that no additional data are being found to facilitate the full development of a category and does not mean exhaustion of data sources. Once the explanatory model is saturated

or well illuminated from the data is the point at which the data collection and analysis cycle can conclude (Bitsch, 2005; Calman, 2006). In this study, data was collected until the envisaged number of 20 participants was achieved.

4.6 Data collection

Data collection was conducted through semi-structured face-to-face interviews involving open-ended questions. Researchers utilising semi-structured interviews start the interviews with a predetermined list of themes, and possibly some key questions related to these themes, to guide the conduct of each interview (Saunders, Lewis, & Thornhill, 2012). This method of collecting data allows the researcher to probe and is intended to elicit in-depth views and opinions from the participants (Creswell & Creswell, 2018). Howitt (2016) indicated that semi-structured interviews are flexible and generally generate extensive and rich data from participants.

In this study, it was initially envisioned that the interviews would be conducted in either Setswana or English depending on the preference of the participants. However, following consultation with the Seleka Tribal Council, the researcher was made aware that there are also Sepedi-speaking residents in the Ga-Seleka area who may be disadvantaged by interviews being conducted in Setswana or English only. The interview schedule was then taken to a Sepedi-English language expert to be translated (see Appendix 1b-Sepedi Interview schedule). Therefore, interviews were conducted in Setswana, Sepedi, or English depending on the preferences of the participants (see Appendix 1a for the Interview schedule- English version and Appendix 1c for Interview schedule- Setswana Version and Appendix 1c for Interview schedule-Sepedi version). All interviews conducted were recorded and transcribed. The recorded interviews were transcribed verbatim and later translated (for the non-English transcripts) into English by an independent Setswana-English and Sepedi-English language expert before any analysis could begin.

4.7 Data analysis

The researcher utilised thematic content analysis to derive the meaning from the data collected. The thematic analysis provides researchers with a method for identifying patterns and themes in the collected data, and for describing and interpreting the

meaning and importance of those themes. The present study followed the six-phase model of data analysis as developed by Braun and Clark (2006):

Phase 1: Familiarisation with the data

This is the initial stage of data analysis which entails the researcher immersing themselves in the data to the point that they are familiar with the depth and content of the data. This stage frequently entails reading data many times and listening to audiotapes multiple times. It is also helpful for the researcher to make notes of what interests them as they engage in this exercise (Braun & Clark, 2006; Braun, Clarke & Weate, 2016). Similarly, in this study, the researcher listened to the audiotapes and read the transcripts multiple times to obtain a thorough insight into the data. The researcher also kept notes and this assisted the researcher to develop an initial idea about the data and their possible meaning in the following phase.

Phase 2: Generating initial codes

This phase includes organising data in a meaningful and systematic manner (Maguire & Delahunt, 2017). This phase involves developing initial codes and labels for important features of the data. The researcher goes through the data items and concludes this phase with a collation of codes and relevant extracts (Clarke & Braun, 2013). Coding can be done by making notes on the texts being analysed and highlighting probable patterns in the data with highlighters or coloured pens. (Braun & Clarke, 2006). For this study, the researcher organised the data through line-by-line coding to identify important features and patterns in the data. Furthermore, in the results chapter, the researcher will demonstrate through some illustrative extracts from one of the original transcripts how notes were made based on multiple readings and replays of audio tapes (see Table 2 in the Results chapter).

Phase 3: Emerging themes

This phase includes sorting and collating codes into potential themes. This procedure also entails gathering all applicable coded data extracts within the themes that have been identified (Braun & Clarke, 2006). Similarly, the researcher sorted and combined various codes to attempt to develop potential themes. In addition, the researcher collated relevant extracts from data within the identified themes. For this study, the

researcher will present Phase 3 and Phase 4 simultaneously in the Results chapter. The researcher will demonstrate using an illustrative table how relevant extracts of an identified theme were collated (see Table 3 in the Results chapter).

Phase 4: Reviewing themes

This phase involves the refinement of potential themes identified in Phase 4. These themes are reviewed, modified, and developed further. At this stage, the researcher reflects on whether the themes tell a compelling story about the data (Braun & Clarke, 2006; Clarke & Braun, 2013; Maguire & Delahunt, 2017). Braun and Clarke (2006) explained that during this phase some themes may collapse into each other whilst other themes may be condensed into smaller units. For this study, the researcher reviewed and modified themes ensuring a coherent story was developed from the data. As indicated above, the researcher will present Phase 3 and Phase 4 simultaneously in the Results chapter. The researcher will present a table to demonstrate the reviewed and modified themes (see Table 3 in the Results chapter).

Phase 5: Defining and naming themes

This phase required the researcher to conduct and write a detailed analysis of individual themes. This process includes identifying the 'essence' of each theme and constructing a concise and coherent account of the theme, with an accompanying narrative (Braun & Clarke, 2006; Clarke & Braun, 2013). Additionally, the researcher also decides on the names of the themes and identifies what story each theme tells and how it's related to the broader narrative of the research study (Braun & Clarke, 2006). For this study, the researcher analysed individual themes comprehensively to construct coherent interpretations of the themes. The researcher will present a table with illustrative extracts in the Results chapter to demonstrate how individual themes were analysed comprehensively in the present study (see Table 4 in the Results chapter). Furthermore, the researcher will present another table demonstrating the names decided for the identified themes and subthemes (see Table 5 in the Results chapter).

Phase 6: Producing the report

This last stage involves compiling a report about the study. This involves telling the story of your data in a manner that convinces the reader of the merit and validity of your analysis. The write-up provides a concise, coherent, logical, non-repetitive, and interesting account of the story the data tell – within and across themes (Braun & Clarke, 2006). “The write-up must provide sufficient evidence of the themes within the data, that is, enough data extracts to demonstrate the prevalence of the theme” (Braun & Clarke, 2006, p. 23). For this study, while compiling the research report, themes relevant to the research questions were selected. Additionally, the researcher utilised extracts from the data to provide sufficient evidence of the themes (as seen in the Results chapter). The researcher also contextualised the narrative from the study data using existing literature (as presented in Chapter 6). The researcher ensured that there was no repetition or duplication of themes by assembling data related to one theme together.

4.8 Development of a psychological model

A model is an abstraction, a mental framework for the analysis of a system. It involves the use of simplified representations of real-world phenomena and can also be utilised in the process of theory (Connaway & Powell, 2010). According to Wacker (1998), the goal of theory-building is to uncover similarities across various domains to improve the abstraction level and importance of the research. The development of a theory follows different stages that are not sequential but interact with one another. The role of the literature search in the research process is extremely significant at all phases of theory development since it provides accepted definitions, domains to which a theory applies, previously identified linkages, and empirical tests. (Wacker, 1998). For this study, the researcher followed the stages of theory building as suggested by Wacker (1998) to develop a psychological model of water conservation:

- a) **Definition of variables-** Here, concepts relevant to the research study are defined using the existing literature. At this step, uniqueness and conservation are key virtues i.e. it encourages the use of currently defined concepts to avoid violating the conservation virtue and where new definitions are used it must be

demonstrated why current definitions are not adequate (Wacker, 1998). For this study, the researcher defined the research variables in terms of the literature already available. The concepts included the extent of water scarcity, the psychological and social effects of water scarcity, water conservation efforts, and factors that affect water conservation. Other concepts of the model including the coping strategies and interventions to deal with water scarcity and promote water conservation were also clarified.

- b) **Limiting domain-** This stage is concerned with establishing where and when the theory can be applied. The issue of generalisability is important because theory-building research extends domains to new broader areas by testing the theory in a new environment or a different period. This implies that theory-building research extends the domains in which the theory can be applied because the more the number of areas wherein a theory can be applied, the more essential it is (Wacker, 1998). During this phase, the researcher outlined conditions for the application of the study's findings; that is, when and where. The developed model could apply to a water-scarce rural community where the community relies on communal taps for access to water.
- c) **Relationship (model) building-** The purpose of this stage is to logically assemble the reasoning for each relationship to ensure internal consistency. This step is necessary to establish which variables have logical connections to other variables, provide new topics for research and incorporate connections for a greater degree of abstraction. The researcher also needs to build relationships with other researchers to ensure the theoretical importance of the research (Wacker, 1998). At this point, the researcher described relationships among variables in the study and integrated the relationships. This included how water scarcity in communities leads to multiple psychological and social problems, as well as how certain behaviours and attitudes affect water conservation efforts.
- d) **Theory predictions and empirical support-** At this stage, the theory must have both internal consistency and empirical riskiness to make predictions. Theory-building research presents empirical evidence to verify that a proposed theory has some merit in the empirical world and also predicts the occurrence of specific

phenomena (Wacker, 1998). For the study, the researcher indicated that water conservation efforts are affected by negative pro-environmental behaviour and attitudes and that water scarcity can lead to psychological problems and disruptions in the daily activities of community members. The researcher further proposed that these psychological problems can lead to people developing coping strategies and interventions to deal with water scarcity.

4.9 Quality criteria

4.9.1 Trustworthiness of the research

According to Brown, Stevens, Troiano, and Schneider (2002), the term "trustworthiness" refers to the conceptual soundness that can be used to assess the research's quality. The factors that enhance the trustworthiness of a research project include the quality of time spent both in the field and with the data, data triangulation, and the researcher's biases, determining what works within the confines and restrictions of the study. Trustworthiness is also strengthened by exploring negative cases that clarify more diverse and clearer expressions of the phenomenon (Brown et al., 2002, p.8). Furthermore, in grounded theory, the researcher is regarded as a trustworthy witness to the data obtained and engages with the analysis accordingly. Honesty and vigilance about the researcher's views, opinions, and emerging hypotheses are vital as the researcher continues to immerse oneself in the data (Gearing, 2004). For this study, trustworthiness was enhanced by utilising credible qualitative research techniques outlined in the previous sections above, as well as being aware of my views and biases whilst immersing myself in the data. Lincoln and Guba (1985) as cited in Anney (2014), further stated that trustworthiness is realised when the following four constructs, credibility, dependability, confirmability, and transferability are achieved satisfactorily.

a) Credibility

Credibility is the alternative to internal validity, and the goal is to validate that the study was carried out in a way that ensured accurate identification and description of the subject. The research findings are checked to establish whether information from the participants' views of the original data is represented and interpreted accurately (De

Vos, Strydom, Fouche & Delpont, 2002). Brown et al. (2002) indicated that credibility is satisfactorily achieved when the theory developed is grounded directly in the data obtained from the participants and reflects the levels, dimensions, and conditions of their experience of the studied phenomena. To achieve credibility for the present study, the researcher ensured that the participants participate freely and thus can openly and freely express their experiences. Thus, the theory developed is grounded in the original data collected from participants as well as their experiences. A semi-structured interview guide was used by the researcher, and it permitted for probing and for recurrent categories to be attained, which helped the researcher to obtain accurate and rich information.

b) Confirmability

Confirmability refers to the extent to which the research results could be confirmed or substantiated by other researchers (Anney, 2014). Confirmability is “concerned with establishing that data and interpretations of the findings are not figments of the inquirer’s imagination, but are derived from the data” (Tobin & Begley, 2004, p. 392). Brown et al. (2002) stated that confirmability examines the objectivity of the research i.e. another researcher can confirm the study when presented with the same data. Gasson (2004, p.93) also stated that confirmability addresses the core issue that “findings should represent, as far as is (humanly) possible, the situation being researched rather than the beliefs, pet theories, or biases of the researcher”. This can be achieved through an audit trail that provides the relevant materials to confirm the study. For Grounded theory these materials may include raw data such as audiotapes, verbatim transcripts, and researcher notes from interviews; and may also include coding and memos from each round of interviews (Brown et al., 2002). For the present study, the researcher kept a safe record of the raw data material, and coding and continuously made use of memos throughout the study. Furthermore, the researcher maintains objectivity by relying solely on the raw data provided by the participants for the development of the theory.

c) Dependability

This is a substitute for reliability, wherein a researcher attempts to explain changes in both the situations of the phenomenon being studied and, in the design, due to the refined and increased understanding of the setting. Dependability refers to the confirmation that the data represents the changing conditions of the phenomenon under study and should be consistent across time, researchers, and analysis techniques (Anney, 2014; Brown et al., 2002; Morrow, 2005). Shenton (2004, p.71) further indicated it is important to report the processes within the study in a detailed manner to allow researchers to replicate the work, if not necessarily to enable future researchers to repeat the work, if not necessarily to obtain the same results. Gasson (2004) also stated that dependability addresses the issue that how a study is conducted should be consistent across time, researchers, and analysis techniques. To ensure dependable and authentic findings, the methods of arriving at the findings should be clear and researchers need to establish clear and repeatable procedures for the way that the research is performed (Gasson, 2004; Morrow, 2005;).

Dependability can be achieved when other individual audits and confirms that the Grounded Theory procedures are followed and verifies that they are used correctly. Peer researchers, student advisors, or colleagues can examine the detailed chronology of research activities and processes or audit trails to determine the reliability of the findings (Brown et al, 2002; Morrow, 2005). In this study, the researcher provided extensive details about the research design as well as data collection and analysis procedure to ascertain dependability. Furthermore, the researcher received supervision throughout the research process from two senior research supervisors.

d) Transferability

Transferability refers to the extent to which the reader can generalise the findings of a study to her or his context and addresses the core issue of the applicability of one set of findings to another setting (Brown et al, 2002; Morrow, 2005). In Grounded theory approaches this “involves employing the constant comparison method to determine

whether a substantive theory fits new data and how the context in which the new data was collected is similar to (or different from) the contexts in which previous data were collected” (Gasson, 2004, p.97). This is achieved when the researcher provides sufficient information about the self (the researcher as an instrument) and the research context, processes, and participants to enable the reader to decide how the findings may transfer (Morrow, 2005). Brown et al. (2002) indicated that the adequate description of these concepts assists future researchers to make determinations about the practical application of the study in other settings. In this study, the researcher clearly described the research population, context, participants, research methodology, and the emerging theory to assist the readers of this study to determine whether the results can be applied in other settings.

4.10 Ethical considerations

4.10.1 Permission to conduct the study

Before conducting the study, the researcher applied for ethical clearance from the University of Limpopo’s Turfloop Research Ethics Committee which was granted in August 2020 (see Appendix 3: Ethical clearance certificate). Following the protocols of local communication, permission to access the participants was also acquired from the Seleka local tribal authority (see Appendix 2a for the Permission letter – English version, and Appendix 2b for the Permission letter – Setswana version).

4.10.2 Informed consent

According to Baker (1994), researchers must ensure that research participants are aware of and comprehend all relevant information regarding the study and that they can freely grant consent. Consent is obtained when participants in a research project understand the study's aims, grasp the amount of involvement, and agree to corporate policies. Participation in any kind of research must be voluntary, and Informed consent is one of how a patient's right to autonomy is protected. The researcher must inform participants regarding all aspects of the research study such as brief details about the study, the purpose of the study, procedures to be followed, any possible benefits and harm as well as any compensation if applicable. Further, the researcher must inform

the subjects about the methods which will be used to protect anonymity and confidentiality and indicate whether there will be other people they discuss the study with. It is vital to also consider that participants with physical, cultural, and emotional barriers may require a very simple language to understand the researcher. The researcher must ensure to obtain an informed consent statement signed by the participants (Fouka & Mantzorou, 2011; Khan, 2014; Neuman, 2011).

For this study, participants were provided with the necessary information about the study before they gave consent (see Appendix 2a for the Informed consent letter and form – English version, Appendix 2b for Informed consent letter and consent- Sepedi version, and Appendix 2c for Informed consent and form – Setswana version) to ensure that they consented to form part of the study well informed about the study. Furthermore, the researcher used the language participants understood.

4.10.3 Voluntary Participation and Autonomy

The assurance of voluntary participation is of paramount importance when conducting a research study and it comprises several activities. Babbie (2010) indicates that no one should be forced to participate in the study despite the idea of voluntary participation is often not easy to apply in practice. This seeks to incorporate the rights of autonomous individuals through self-determination hence the freedom to withdraw from the study at any stage must be explained to participants (Fouka & Mantzorou, 2011). For this study, participants were made aware of their freedom to decide whether they form part of the study and were not coerced into anything. The research participants were advised that they have the freedom to withdraw their participation in the study at any time they want.

4.10.4 Confidentiality, privacy, and anonymity

Safeguarding information regarding the information obtained during the data collection process is crucial. Gregory (2003) stated that maintaining confidentiality means not only not exposing to outsiders what participants have entrusted you with in confidence, but also guarding against a breach of secrecy occurring accidentally or as a result of carelessness on the part of the researcher. Anonymity is protected when the participants' identity cannot be linked with personal responses and it is considered an

invasion of privacy when private information such as beliefs, attitudes, opinions, and records is shared with others without the individual's knowledge or consent, it is considered an invasion of privacy. Therefore, if the researcher is unable to guarantee anonymity and privacy to the participants, the issue of confidentiality, which is the management of private information by the researcher to protect the subject's identity, needs to be addressed (Fouka & Mantzorou, 2011). In the same manner, the researcher in the current study made certain that confidentiality is preserved. In this case, confidentiality was maintained by ensuring that participants' interview schedules and transcripts were securely filed and that the information could only be accessed by members of the research team. The researcher also used codes to identify the participants instead of using their names.

4.10.5 Beneficence and non-maleficence

The confidence that participants will not be harmed is critical and may have an impact on the entire study process. According to Scott (2013), the principle of beneficence refers to the need to protect the well-being of study participants as much as feasible. As a result, study subjects should be treated with respect and should not be harmed. This means avoiding intentional harm and increasing potential benefits while reducing risks. To protect the safety of human participants, risk analysis is an important part of the ethics review process and should be completed before ethical approval. The analysis should evaluate the link between the research participants' risks and the anticipated rewards (if any) and/or the significance of the prospective knowledge gathered (Kruger, Ndebele & Horn, 2014).

According to Khan (2014), one of the most general ethical issues in research to consider is to never cause unnecessary or irreversible harm to participants, unnecessarily humiliate, degrade, or release harmful information about specific individuals that was collected for research purposes. Non-maleficence mandates that both intentional and potential harm be avoided. A researcher must assess all the research's potential effects and weigh the risks against the advantages. (Fouka & Mantzorou, 2011). In the present study, the researcher conducted a risk-benefit analysis to learn about what may be harmful or beneficial to participants, to ensure that harm is avoided and the benefits are maximised and risks minimised. The

researcher also made certain that the research participants were not harmed in any way.

4.10.6 Respect and Dignity

Respect for human dignity is of paramount importance, particularly in research involving human beings. In research, this implies that the needs and integrity of participants cannot be ignored to achieve research objectives (The National Committee for Research Ethics in the Social Sciences and the Humanities [NESH], 2016). NESH (2016) further stated that the research processes must ensure freedom and autonomy, protection against harm and unreasonable suffering, and protect the privacy and close relationship. Researchers can show respect for human dignity by choosing research topics that are sensitive to human dignity, related respectfully to the participants, and in the manner they report the research results. In the present study, participants were treated with the utmost respect by protecting their privacy and ensuring autonomy to participate in the study. The researcher also showed respect to participants by interviewing them in their homes, observing, and respecting their cultural values and practices as well as guarding against causing unreasonable harm.

4.11 Concluding remarks

This chapter provided in detail the discussion of research methods used in the study. This study used qualitative research, as previously stated. The participants' information was gathered through in-depth interviews. A data recorder was used to accurately capture the information to assist the researcher to keep accurate information. Data were analysed using thematic content analysis and the stages followed for theory building in the study were also outlined. Lastly, ethical considerations were presented. These, included permission to conduct the study, respect and dignity, informed consent, autonomy, and aftercare of participants as well as confidentiality. The next chapter presents the results of this study.

CHAPTER 5: PRESENTATION OF RESULTS

5.1 Introduction

The study aimed at exploring the perceptions of community members in the Lephalale area toward water conservation. The results are going to be discussed in two parts; Part A and Part B. Part A will present a discussion of the identified themes, relationships within the themes as well as excerpts from interview transcripts which are verbatim responses of participants. In Part B, the psychological interpretations and analysis of the themes will be presented. Based on these psychological interpretations, a psychological model will be presented in Chapter 6.

5.2 Demographic information of participants

The study comprised 20 participants who reside in the area of Ga-Seleka. As shown in Table 2 above, the sample comprised equal gender representation (Male = 50% and Female= 50%). The sample comprised participants between the ages of 40 and 60 years. Half (10) of the participants get access to water from communal taps, whereas 7 participants rely on both communal taps and boreholes for water access. Furthermore, 2 participants get water from communal taps, taps in their yards and boreholes, and 2 from communal taps and taps they connected in their yards.

Table 1: Demographic details of participants

Participant	Gender	Age	Occupation	Water Access
1	Male	55	Unemployed	Communal
2	Male	53	Farmer	Communal & Borehole
3	Male	46	Teacher	Communal & Borehole
4	Male	59	Headman	Communal & Tap in the yard
5	Male	60	Entrepreneur/ Self-Employed	Communal & Borehole
6	Male	57	Tribal Council Secretary	Communal

7	Female	43	Unemployed	Communal
8	Male	45	Community Worker (CWP)	Communal
9	Female	51	Teacher	Communal & Borehole
10	Female	47	Community Development Practitioner (CDP)	Communal
11	Male	58	Unemployed	Communal
12	Female	53	Domestic Worker	Communal
13	Female	58	Unemployed	Communal
14	Male	56	SARS Inspector	Communal & Borehole
15	Female	52	Unemployed	Communal
16	Female	47	Unemployed	Communal & Tap in Yard
17	Female	46	Cleaner	Communal, Tap in yard & Borehole
18	Female	48	Domestic Worker	Communal & Tap in Yard
19	Male	47	General Worker	Communal
20	Female	53	Teacher	Communal & Borehole

5.3 Part A: Thematic analysis

5.3.1 Introduction

As outlined in Chapter 4, which is the previous one, the researcher followed the six phases of thematic data analysis as outlined by Braun and Clarke (2006). The researcher started by familiarizing herself with the data by listening to the audiotapes and reading the transcripts multiple times to gain an in-depth understanding of the data. In this chapter, the presentation of the results will begin with phase 2 (namely, generating initial themes) as outlined in the following section below.

5.3.2 Developing initial codes and labels

This section presents initial codes and labels from the data following the researcher listening to the audio recordings multiple times and identifying important features of the data. Below is the table illustrating extracts from the participants' narratives as well as initial codes and labels that were developed:

Table 2: Developing initial codes and labels

Extracts	Possible codes & labels
<p><i>“We store our water in the water tanks and drums so that even if the taps don’t have water or it doesn’t rain a lot, we still have a bit of water to use. I teach my children not to touch the taps and if they want water they can get water from the drum” (Participant 16).</i></p> <p><i>“Most people use a lot of storage facilities such water tanks and drums to store the water to have more water to use in times of need” (Participant 14).</i></p> <p><i>“We must put water in our buckets and containers so that we can store water in there for future use” (Participant 17).</i></p>	<p>Using storage in tanks</p> <p>Storage facilities</p> <p>Water for future use</p> <p>Coping strategies</p>

5.3.3 Sorting and collating codes and developing themes

The following section will be presenting phases 3 and 4 of thematic analysis as outlined by Braun and Clarke (2006) (namely, emerging themes and reviewing themes). This section illustrates how the relevant data extracts within the identified themes were collated as well as the reviewed and modified themes.

Table 3: Emerging and reviewed themes

Emerging themes	Extracts	Reviewed Themes
Educational programmes	<p><i>“We need serious awareness campaigns and having community meetings so that people can be taught as well as express themselves” (Participant 10).</i></p> <p><i>“I think we can our people need education and training...” (Participant 11).</i></p> <p><i>“I think the best way is for people to be taught. We can have a community meeting where people can be taught about water conservation and how people should use water appropriately” (Participant 12).</i></p> <p><i>“People need to be taught about water conservation, people can be gathered in a community hall so that they can be given information about the importance of water and how to conserve water” (Participant 16).</i></p>	Enhancement of knowledge regarding water conservation
Regulating water-use	<p><i>“Water is not regulated well in our communities, they should install the metre boxes, maybe when there is money involved people will realise that they can’t just use water as they please” (Participant 10).</i></p> <p><i>“I think it would be better if the government install water meter boxes. Perhaps if there is the monitoring of water use like that people might start taking the issue of water conservation seriously. People will pay for the water they use (Participant 12).</i></p> <p><i>“If we want to regulate water use in our community and improve water conservation, perhaps we should</i></p>	Water-use behaviour regulation and monitoring

	<p><i>put a tap in each household and then install water metre boxes which will help keep people accountable for water usage in their yards. People would then pay according to the amount of water they use” (Participant 14).</i></p> <p><i>“Perhaps if they can install metre boxes also for us, people can start saving water and being cognizant of how much water they use” (Participant 17).</i></p>	
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5.3.4 Defining and naming themes

This section presents phase 5 of thematic analysis named; defining and naming themes. The section illustrates how the researcher conducted a detailed analysis of individual themes to identify the crux of each theme and construct a concise and coherent account of the theme, as seen below in Table 4:

Table 4: Example of detailed analysis of each theme

Theme	Subthemes	Extracts
Water consumption	1. Water consumption patterns of participants	<p><i>“We use water to drink, bathe, cook, and sometimes when getting more water, we water our plants. We also use water for our livestock” (Participant 4).</i></p> <p><i>“We use water for cleaning the house, bathing, cooking, washing our clothes, and sometimes watering our gardens and livestock” (Participant 13).</i></p> <p><i>“We use water for washing things, for our livestock, and also for our</i></p>

	<p>2. Meanings attached to the water</p>	<p><i>agricultural fields, that is why I say water is important” (Participant 2).</i></p> <p><i>“Water is life” (Participant 5).</i></p> <p><i>“Water is a source of life, you can’t do anything without water and life would be difficult” (Participant 10).</i></p> <p><i>“Water is life, there is no animal or person who can survive without water because we use water to drink, to bath for hygiene purposes. Water also purifies our world, because when the world does not have water, nature’s beauty won’t show” (Participant 2).</i></p> <p><i>“Sometimes we use water for spiritual things like cleansing because water is a source of life” (Participant 3).</i></p>
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Furthermore, this section presents the names decided for the themes. Five categories of themes were finalised from the data analysis process. The first group of themes encompasses the experiences of participants regarding water scarcity as well as coping strategies developed to deal with water scarcity. The other categories of themes that were also found important include perceptions and experiences of participants regarding water conservation, behaviours that hinder water conservation, and behaviours and interventions that promote water conservation. The various themes and subthemes are presented in tabular form, as reflected in Table 5 below.

Table 5: Themes and subthemes

Themes	Subthemes
1. Experiences of participants regarding water scarcity	<p>1. Water consumption</p> <ul style="list-style-type: none"> a) Water consumption patterns of participants b) Meanings attached to the water <p>2. Participants' experiences of water scarcity</p> <ul style="list-style-type: none"> a) Unreliable water availability and supply b) Unfair distribution of available water c) Effects of water scarcity
2. Coping strategies	<p>1. Participants' coping strategies to deal with water scarcity</p> <ul style="list-style-type: none"> a) Water storage b) Re-use of water c) Rainwater harvesting d) Use of private water sources e) Behavioural adjustments
3. Perceptions and experiences regarding water conservation	<ul style="list-style-type: none"> 1. Knowledge of water conservation 2. Experiences regarding water conservation
4. Behaviours that hinder water conservation	<p>1. Habits & Poor Decision-making</p> <ul style="list-style-type: none"> a) Negative water consumption habits b) Water consumption habits in Children c) Poor decision-making <p>2. Attitudes, Beliefs & Perceptions</p> <ul style="list-style-type: none"> a) Negative thoughts, beliefs & attitudes about water <p>3. Lack of accountability</p> <ul style="list-style-type: none"> a) Lack of responsibility for reporting leaking taps, pipes & hosepipes b) Selfish behaviours/acts c) Lack of knowledge regarding contamination of water sources

<p>5. Behaviours and interventions to promote water conservation</p>	<p>1. Water consumption and infrastructure monitoring</p> <ul style="list-style-type: none"> a) Monitoring water consumption behaviour b) Collective monitoring of communal taps c) Monitoring and maintenance of water infrastructure <p>2. Behavioural change interventions and techniques</p> <ul style="list-style-type: none"> a) Enhancement of knowledge regarding water conservation b) Encouragement of positive behaviour toward water conservation c) Early childhood interventions d) Modeling positive water-related behaviours in children e) Ongoing reminders regarding water conservation <p>3. Regulation of water consumption</p> <ul style="list-style-type: none"> a) Water-use behaviour regulation and monitoring b) Discouragement of negative water consumption behaviour

5.3.5 Telling the Story

The following section presents phase 6 of the thematic analysis (producing the report) and will include a concise and coherent account of the story across themes and subthemes as extracted from the data. The researcher will also present extracts and narratives from the participants that are relevant to each theme:

5.3.5.1 Experiences of community members regarding water scarcity

5.3.5.1.1 Water Consumption

It was key for the researcher to comprehend how and for what purposes the participants used water, to understand the depth of the issues as presented further in the following discussions. The following section presents the patterns of water consumption of participants as well as the meaning participants attached to water.

a) Patterns of water consumption

When asked “What do you use water for in their households”, the majority of the participants reported that they use water for significant daily activities such as drinking, cook, bathing, washing dishes and clothes, and for sanitation purposes:

“We use water to drink, bathe, cook, and sometimes when we get more water, we water our plants” (Participant 4).

“We use water to cook, bathe, drink, and wash the clothes because it won’t be hygienic and healthy to wear dirty clothes. We use water also to clean and to water our plants which are also very important because we get food from these trees” (Participant 12).

Moreover, it was also apparent from that other participants also use water for agricultural purposes such as irrigation and their livestock, as well as for sanitation purposes:

“... and sometimes watering our gardens and livestock” (Participant 13).

“We use water for washing things, for our livestock, and also for our agricultural fields, that is why I say water is important” (Participant 2).

“...we use our borehole water to water the plants” (Participant 6).

“We use water to water our plants, to bath and wash our clothes, as well as to cook. Some people who have flushing toilets in their homes, use the water for that purpose” (Participant 9).

One participant indicated that at times water is used for spiritual purposes. Below is the excerpt from the interview:

“People use water for religious and spiritual purposes such as cleansing ceremonies. They believe water is for life, and that life is connected to the physical and spirit” (Participant 3)

Based on the extracts above, it appeared that water is indeed of paramount importance in the participants’ lives. It is apparent that water is used for various activities such as drinking, cooking, bathing, washing dishes and clothes, sanitation, and agricultural and spiritual purposes.

b) Meanings participants attached to the water

Participants alluded to the importance of water in their lives. The symbolic and spiritual meanings of water were evident. The extracts below illustrate the participants’ narratives:

“Water is life” (Participant 2).

“Water is a source of life, you can’t do anything without water and life would be difficult” (Participant 10).

“Water is life and very important because without water you will be limited, you won’t bath, you won’t cook or wash your clothes” (Participant 11).

“...Water is important and is life, without water conservation our lives would be difficult because we must bath, wash, clean and cook” (Participant 19).

“Water is life, there is no animal or person who can survive without water because we use water to drink, to bath for hygiene purposes. Water also purifies our world, because when the world does not have water, nature’s beauty won’t show” (Participant 2).

“Water is life and needs to be taken care of” (Participant 12).

“Sometimes we use water for spiritual things like cleansing because water is a source of life” (Participant 1).

“Water is not only important to us as humans but is also important to our livestock. Our livestock such as cows, goats, sheep, and donkeys also need water to survive” (Participant 7).

“People use water for religious and spiritual purposes such as cleansing ceremonies. They believe water is life, and that life is connected to the physical and spirit” (Participant 3).

The extracts presented above showed that the meanings participants have attached to water are based on how they perceive and use water. It appeared that water symbolises life to most participants. Other participants recognised the roles of water in their spiritual lives such as cleansing and purification. Participants have attached significant symbolic meanings to their lives.

5.3.5.1.2 Participants’ Experiences of water scarcity

The following section presents the experiences of participants regarding water availability, supply, and scarcity in their community.

a) Unreliable water availability and supply

The participants expressed various thoughts and emotions regarding the state of water availability and supply in their community:

“There is a major water shortage in our village. It is such a big problem” (Participant 11).

“We are struggling with water shortages and sometimes I hear on the radio they would be saying that the world is drying up and it’s possible that we might not even get water from boreholes” (Participant 12).

“There is a shortage of water here, people can go up to 2 weeks without water in their taps” (Participant 10).

“There is a serious shortage, especially in new villages. People can stay for 3 days or even a week without water” (Participant 15).

“There is a major water shortage in our village. I have been staying in this village possibly for over 20 years and I don’t know water from the municipality. There is no water in our community” (Participant 14).

“Water scarcity is too high. The other concerning issue is that there are people who go to work in the early morning and come back in the evening. When they come back in the evening, they find the taps without water, this is violating our rights” (Participant 2).

“We have water shortage and scarcity so much in our community. Because we don’t get water every day, sometimes we can go up to a day without getting water” (Participant 20).

Furthermore, the participants narrated the severity of water shortages and scarcity in the community. The extracts below illustrate the participants’ narratives:

“Water is very scarce here at Ga-Seleka” (Participant 3).

“People can go 2 weeks without getting water” (Participant 12).

“We have lost hope because we have been struggling with water shortages for a long time. We can go up to 3 weeks or a month without having water in the village. We don’t even know who and where to report to anymore. This has been reported multiple times to the municipality and they promised to help. But we still struggle (Participant 13).

“Sometimes we can go days, up to 2 to 3 days without access to water” (Participant 5).

Feelings of frustration and hopelessness regarding the shortage and inaccessibility of water in their community were prevalent in the extracts above. Some participants felt violated as their rights to access water were disrespected. Unmet expectations and

unfulfilled promises by authority figures, regarding the provision of water, have led to psychological distress among participants.

b) Unfair distribution of available water

Participants expressed various feelings and thoughts regarding the unequal water supply and distribution issues within the community:

“We have two sections, we have Section A and Section B, in most cases, it’s only sectioned A that has access to water because it’s an old section but people in the new section struggle to get water. I think might be because the reservoirs we have only supply water in the old section so water is not able to reach us here in the new section” (Participant 14).

“There is a serious shortage, especially in new villages” (Participant 15).

“... after the extension of the village, we have new stands now and so we who reside at the steep hill the water can’t reach us. We don’t get water fairly and equally” (Participant 16).

“The water pipes provided in our area are not sufficient to supply water to all citizens. Only old villages were supplied with water pipes and now this creates a problem for new villages. It is unfair for other people to have access to water while others don’t” (Participant 7).

“I realised that in this village, there are people who receive water and those who don’t” (Participant 8).

Moreover, it appeared that other participants feel unfairly treated as they are unable to receive water based on the geographical locations of their households:

“...the other side of the village that is steep does not get water because water does not reach them. Especially in the new stands but we in the older section we get water” (Participant 6).

“The ones that reside by the lower side of the river have access to more water than us who reside on the higher/upper side of the village. The water does not reach us all the time” (Participant 2).

Feelings of frustration and anger appeared to be prominent in the participants' narratives as they express that the water available is not distributed equally and fairly amongst community members. It is also apparent that other participants feel unfairly treated as they are unable to receive water based on the geographical locations of their households. Feelings of resentment amongst community members also appeared to emerge as other participants feel unfairly treated and that the scarce resource is not distributed fairly.

Some participants expressed that at times, these inequalities in water access are caused by the old water supply infrastructure being used:

“The other issue is that some of the equipment the government still use are very old and are unable to supply water appropriately to the community. I am talking about the dams and pipes which are old and messed up” (Participant 10).

“The population keeps growing but infrastructure remains the same size which can't accommodate the whole village. Let us say, the dam/reservoir had a capacity of 8000 litres for about 400 villagers. Now the population has grown and is now more than 400 people” (Participant 11).

“These are old reservoirs that were built years ago for the old section. In the new section, we don't have reservoirs, I know there are pumps next to the river that pumps water to the old reservoir which only supplies to the old section and we don't get water this side” (Participant 14).

“The population is growing and we have only one reservoir for water in our area, which is enough. It pumps for Wyk 2 and Wyk 3... the two biggest areas in this community, so when they pump the water, it only takes 30 minutes for the water to be finished” (Participant 2).

“We have four sections in our village, we have Wyk 1 which has its reservoir, Wyk 2 shares water with Wyk 3. Wyk 4 is the one that has major water challenges. They struggle a lot, we have asked the municipality to get a pump for them perhaps our dams can supply them with water” (Participant 6).

“The water pipes provided in our area are not sufficient to supply water to all citizens. Only old villages were supplied with water pipes and now this creates a problem for new villages” (Participant 7).

The extracts above revealed feelings of disappointment regarding the water infrastructure not being upgraded and maintained to meet the growing population demands. Some participants indicated that the infrastructure that is used to supply water is old and expressed disappointment at the local authorities for not catering to newer sections of the village.

Some participants expressed feelings of shame associated with traveling distances and queuing for long periods to access water in other parts of the village:

“If it’s not rainy season, the other side of the village, especially in the new stands don’t get water. They have to walk down towards our section to get water from our communal taps that have water” (Participant 18).

“People struggle a lot. I see people traveling long distances to reach taps that have water” (Participant 7).

“Sometimes the municipality brings us water tanks but ques are very long and you wait for long periods just to get water. It’s a shame on us, we are struggling” (Participant 13).

“People from the new section walk down towards our section to get water from our communal taps that have water. Imagine! Pushing that wheelbarrow for so long just to get water” (Participant 18).

Feelings of disappointment towards local authorities regarding the unfair distribution of water were prevalent. It appears that participants think that this is due to old water infrastructure that has not been upgraded to cater to the growing population. The

extracts presented above also indicated that participants experienced feelings of shame associated with traveling long distances and queueing for long periods to access water.

Furthermore, some participants expressed that at times, these inequalities in water access are caused by the illegal connections and theft of the communal taps and pipes:

“Even after heavy rains we still struggle to get water, and sometimes this is caused by the fact that other people have connected their taps illegally and have also installed pressure pumps in their yard” (Participant 10).

“Even these taps get stolen because they are outside and have no one who owns them, so people just take them. On that new side of the village, they had brought water tanks for them because they do not have water yet, the taps of the water tanks we stole, nobody knows by who. So now they can’t get water in those water tanks because they need to replace those taps first” (Participant 4).

“Some people have opted to put their pipes on the communal pipes and then have their taps in the yard” (Participant 19).

“I realised that in this village, there are people who receive water and those who don’t. The well-off people connect pressure pumps to the communal taps and when water is pumped they switch on their pressure pumps to fill in their drums. Those with no pressure pumps end up not getting water. The issue around pressure pumps must be resolved so that water can reach all the people” (Participant 8).

“We don’t share water equally. Everybody cares for themselves. People here have installed pressure pumps from the communal taps. The water runs out before we can get access to it, because of these pressure pumps. It is unlawful to do so” (Participant 15).

“... we don't get access to water fairly and people often think selfishly by stealing those communal taps” (Participant 16).

Based on the extracts above, participants' feelings of anger regarding being unable to receive a fair water supply due to the theft of water infrastructure were evident. Feelings of confusion were also apparent as participants appear not to understand the reasons people would steal the water infrastructure that is meant to benefit the whole community.

c) Effects of water scarcity

The participants alluded to the effects of water scarcity on their daily functioning and general well-being:

“We can go about 2 weeks without doing the washing because water is very scarce. Imagine, not washing your clothes, how embarrassing is that? Our hygiene is affected, you see now because we have rain, people are busy doing their laundry, even old clothes from December and blankets from last year's winter, we are only washing them now” (Participant 13).

“When we don't have water, our hygiene also suffers because we can't clean and wash our clothes and our livestock suffers as well” (Participant 16).

“This is so sad because we have to settle for salty water from boreholes which is not good” (Participant 14).

Participants alluded to the interpersonal conflicts resulting from water shortages in the area:

“Sometimes the government supply water by bringing water tanks. Sometimes people fight for this water” (Participant 13).

“We do not share water equally. Everybody cares for themselves. People here have installed pressure pumps from the communal taps. The water runs out before we can get access to it, because of these pressure pumps. This is irritating” (Participant 15).

“There were people from neighbouring villages who also struggle with water who would come get water from water taps on the streets. We can’t share with them as we are also struggling with water. It might sound bad, but we can’t share with them and our livestock” (Participant 9).

“I realised that in this village, there are people who receive water and those who don’t. The well-off people have pressure pumps and when water is pumped, they switch on their pressure pumps to fill in their drums” (Participant 8).

A few participants also expressed frustration and helplessness regarding the financial implications of water scarcity. The extracts below present the participants’ narratives:

“... people must now go buy water from those who have boreholes in their yards, which is now a challenge financially” (Participant 10).

“We survive by buying water from other people who have boreholes. You would buy a water drum for about R35/R25 and the prizes differ according to who is selling to you and how much water you need” (Participant 13).

“The water is not sufficient and therefore people are forced to buy water from those with boreholes” (Participant 1).

“The other issue is that we do not get water daily. In this instance we are forced to buy water from those with boreholes” (Participant 15).

“When the government water is not available on the day, we do not have a choice but we go to people who have boreholes and buy water from them. This requires us to have money to be able to get water, imagine that!” (Participant 20).

“Water scarcity is so high in our community. It is very costly to drill a borehole but what choice do people have?” (Participant 10).

“Many of us do not have access to water and have resorted to drilling boreholes to get water. This is so expensive, but we don’t have a choice” (Participant 3).

“We have lost hope because we have been struggling with water shortages for a long time. We even think the best way is to drill boreholes. This means we spend a lot of money trying to get water” (Participant 13)

“In my house, we spent about R45 000 to drill boreholes and we didn’t have a choice because there is no water in our area” (Participant 14).

“We spend a lot of money just to get water. We have three taps in the yard which we all had to pay for” (Participant 17).

“I made plans to drill a borehole in my yard. It cost me a lot but I did this for the sake of my family” (Participant 5).

Based on the extracts above, it appeared that shortage of water affects the activities of daily living such as bathing and grooming. The general hygiene of participants is affected as they can go weeks without cleaning and washing their clothes. Furthermore, the relationships are also affected by water scarcity as people fight for the available water. Additionally, it appeared that these interpersonal conflicts may lead to the deterioration of relationships amongst community members, as well as between community members and neighbouring villagers. Furthermore, the extracts above indicated that participants’ daily activities may be disrupted as they have to travel long distances fetching water from other sections or villages to fetch water. Feelings of frustration and helplessness regarding the financial effects of water scarcity were also apparent. A few participants showed feelings of frustration regarding buying water from people who have boreholes in their yards. Some participants expressed feelings of helplessness as they indicated that they had no choice but to spend money drilling boreholes due to water scarcity in the area.

5.3.5.2 Coping strategies

The following section presents various coping strategies developed by participants to cope with water shortages and scarcity in their community:

5.3.5.2.1 Water storage

Most participants alluded that the most common coping strategy is the proper storage of water. Below are the participants' narratives:

"To encourage one another to safe water, there must be containers that can be filled with water. When someone needs to drink, he or she must use water from these containers. No one must use a hand to drink water from the tap" (Participant 1).

"We store our water in the water tanks and drums so that even if the taps don't have water or it doesn't rain a lot, we still have a bit of water to use. I teach my children not to touch the taps and if they want water, they can get water from the drum" (Participant 16).

"We keep water safety in our drums and buckets and then use water from there" (Participant 7).

"I fill up my Jojo tanks so that we have more water for use in future and we don't waste water from the taps" (Participant 19).

"Most people use a lot of storage facilities such water tanks and drums to store the water to have more water to use in times of need" (Participant 14).

"We must store our water in the water tanks and storage facilities and we must use water sparingly and only when needed" (Participant 18).

"The first thing is that we store water in our tanks. This water needs to be used sparingly and only for important things such as cooking and washing" (Participant 15).

"We must put water in our buckets and containers so that we can store water in there for future use" (Participant 17).

"A lot of people use drums to preserve water" (Participant 2).

“We can store water in water storage facilities such as big water containers and drums, and store enough water that can last them for days” (Participant 6).

“I would rather do that store water in the bucket instead of constantly opening the tap on the basin” (Participant 12).

Based extracts above, it appeared participants have developed ways to cope with the shortage of water in the community. The study revealed that one of the coping mechanisms participants have adopted is to store water in different water storage facilities such as water drums, tanks, containers, and buckets. This manner of coping has been helpful to the participants to have water for consumption during times of need.

5.3.5.2.2 Re-use/Recycling of water

Participants further shared another method of coping with water shortages. Below are the extracts from the participants' interviews:

“I think we can consider re-using water for example because the water that we use to rinse the dishes and clothes is mostly fairly clean, we can re-use the other for other things such as watering our plants” (Participants 8 & 9).

“We are re-using the water for bathing and washing to water the plants” (Participant 7).

“We have a swimming pool in my yard which may need a lot of water and is part of our business. After the water in the pool gets contaminated in about 3 days, we use the water from the pool to water our lawn, our fruit trees and plants except for the vegetables which we use clean water for” (Participant 3).

“We can re-use water for other things in the house” (Participant 20).

“We must learn to reuse water, for example, the water I use for washing the dishes in the basin, I don't just throw it out, but I leave it in the basin, and as we eat throughout the day, we wash our dishes in that water until it is dirty then we can put clean water” (Participant 16).

“In our households, we can try to re-use water that is not very dirty and that had been purified using things like Jik” (Participant 6).

“I think people should learn to re-use water. For example, the water I use to rinse my dishes can still be used to mop the house because the water is not dirty. People can also use the water used to do laundry to water the plants because the water won’t be too dirty and the soap won’t have much negative effect on the plants” (Participant 19).

“We must also re-use water by watering our gardens with the already used water” (Participant 15).

“I also re-use water a lot, for example, I would use the water I use for rinsing the dishes to wash new dirty dishes instead of throwing the water away” (Participant 18).

“We re-use water that is used for washing our clothes to water our plants, especially water that does not have harmful chemicals or is not too dirty. Instead of using freshwater to water our plants. We can also use water that has chemicals like Sta-Soft to pour in our pit toilets to kill the smell” (Participant 11).

“People could re-use water and not use water once-off” (Participant 17).

“... after taking a bath water should not be spilled but rather be used to water trees. Trees can also rely on used water for their growth” (Participant 1).

One participant expressed a hygiene-related concern regarding the re-use of water as shown below:

“... by law, re-suing water can be difficult... the water may rather be used to water plants or trees because you can’t take used and dirty water and use it to water the cabbage or tomatoes. The water would be dirty. It would mean eating your dirt” (Participant 2).

The extracts above revealed another coping strategy used by participants to deal with water shortages in the community. The study showed that participants re-use water

by watering plants, and cleaning and rinsing clothes and dishes. It appeared that this manner of coping has assisted the participants to preserve water for longer periods. Although one participant expressed concern regarding re-using water, it appeared the majority of participants have adopted this coping strategy.

5.3.5.2.3 Rainwater harvesting

The following subtheme shows excerpts of participants' thoughts about harvesting rainwater can help them to cope with water scarcity:

“When it rains like this, we can harvest or store a lot of rainwater, and use it instead of using the water from the communal taps. We can use the rainwater for drinking and watering our plants” (Participant 11).

“The other thing is that we need to learn to harvest rainwater when it rains so we can use the water. We use it to drink, do the washing, and cook” (Participant 10).

“We use our water storages such as baths, water drums, and Jojo tanks to harvest rainwater and we are now doing our washing with that water” (Participant 13).

“We do rainwater harvesting a lot and we use our water containers and baths to harvest the rainwater. We use this water to wash our clothes only not to drink” (Participant 17).

“You see how it rained I am not going to use the water from the taps to water the plants because they have been watered by the rain. All these drums you see here are full of rainwater. We use rainwater to wash our clothes, for drinking and others use rainwater to bath” (Participant 14).

“In the olden days, our forefathers used to harvest rainwater and we still do that even today. It is believed that rainwater is good and has healing effects. We use the rainwater for cleaning, drinking, washing our clothes, and for our livestock” (Participant 16).

“People have the water tanks that are used to harvest rainwater to supplement the water from the taps. Most of us harvest and use rainwater in our homes” (Participant 20).

“We preserve rainwater in our drums for future use. We use this water for washing, cooking, and cleaning our homes. If it rains, we don't need to water gardens because rain shall have done so” (Participant 15).

“Our drums, baths, and containers are full now with rainwater. We use it for bathing, drinking, cooking, and irrigating our plants” (Participant 8).

“When it rains, we harvest rainwater so that we can use it in our houses” (Participant 19).

Although most participants indicated that they use rainwater the same way they use tap water, one participant expressed hygienic concerns about this. Below is the excerpt from the participant's interview:

We still harvest rainwater, and when it rains, we put our storage to get the water so we can use it in our houses. But I don't think we can use rainwater to cook, because sometimes when it rains after a long time, the water might be contaminated by our dirty roofs and garters, so the water is used for washing clothes, dishes and also watering plants” (Participant 9).

Based on the extracts above, it is perceivable that harvesting rainwater is another coping strategy majority of participants to deal with water scarcity. Participants have opted to harvest rainwater to have more water for consumption as well as to use in times of need. Although one participant raised concern about hygiene regarding using rainwater, it is obvious that a greater number of the participants have adopted this coping strategy and use the harvested rainwater for similar household chores as they would with tap water.

5.3.5.2.4 Use of private water sources

Participants highlighted the decision to opt for private water sources to deal with water scarcity in the community. Below are the extracts from the interviews:

“Many of us do not have access to water and have resorted to drilling boreholes to get water. This is so expensive, but we don’t have a choice” (Participant 2).

“Water scarcity is so high in our community. This is the reason why most people opt to drill boreholes because water is so scarce. It is very costly to get a borehole but what choice do people have?” (Participant 9).

“We have lost hope because we have been struggling with water shortages for a long time. We even think the best way is to drill boreholes although a lot of people did not get water when trying to drill boreholes because underground water is also drying up. This means we spend a lot of money trying to get water” (Participant 20).

“it is difficult to survive without a borehole here, so most of us have opted this is the best way to survive the shortages of water” (Participant 3).

“In my house, we spent about R45 000 drilling boreholes and we didn’t have a choice because there is no water in our area. I know it’s a lot of money but we had to drill three holes, as the other two boreholes dried up quickly. We are relying on the third borehole for water” (Participant 14).

“We spend a lot of money just to get water. We had to drill boreholes multiple times” (Participant 17).

“I know that Limpopo province struggles with water shortages so I made plans to drill a borehole in my yard. It cost me a lot but I did this for the sake of my family” (Participant 5).

“I envy those that have boreholes in their yards, one day when I afford it, I will also get it to have access to water without worry” (Participant 15).

The extracts presented above indicated that some participants have opted to drill boreholes in their yards to cope with water shortages in the community. These participants felt that although it was costly to drill boreholes, it was better because they would have access to water privately without struggles.

5.3.5.2.5 Behavioural adjustments and lifestyle changes

Participants reported making behavioural adjustments to cope with water scarcity in the area. The following extracts illustrate this subtheme:

“We make sure we use water sparingly by measuring water for use. We don’t even take full proper baths. We make sure the little we have is used well” (Participant 13).

“We use water sparingly. I don’t fill up my jug anymore when I need water to drink. I would rather use a small cup that I know I will finish” (Participant 15).

“We use water sparingly and avoid using water directly from the taps as water can spill but should rather use from the container in the house” (Participant 3).

“I use water sparingly these days and only when it’s needed. I measure the water I want to use as needed to avoid using a lot of water when not necessary” (Participant 18).

“Our children need to learn how to use water sparingly for example if they are playing outside and they get thirsty, they need to understand that they don’t have to use their hands when drinking from taps as water would spill everywhere, but they can rather use small containers or bottles” (Participant 7).

“We use water sparingly by minimising how we use it so that we do not waste it. For example, in my house, we have agreed on how much we use for drinking and how much for bathing and we have different containers for bathing and drinking” (Participant 8).

“I would rather use water stored in the bucket instead of constantly opening the tap on the basin and use enough water needed to wash the dishes” (Participant 12).

“We now use water sparingly by only using the required portion and not just filling up the baths or jugs unnecessarily” (Participant 9).

Furthermore, some participants advocated for lifestyle changes and adjustments such as limiting how often they water their gardens and not watering their plants after rainfall:

“To save water, I avoid planting trees that do not bear fruits, they are unnecessary and use a lot of water. I only plant fruits and vegetables” (Participant 7).

“I think it is also better to water your plants once a week instead of daily to avoid wasting a lot of water” (Participant 12).

“If it rains, we don't need to water gardens because rain shall have done so” (Participant 15).

“I avoid planting trees like evergreen trees because they require a lot of water and plant trees such as fruits and vegetables that do not require a lot of watering” (Participant 10).

“We can also avoid watering our lawns every day. Perhaps we can water our lawns once in a while.” (Participant 6).

From the extracts above, it is apparent that participants have adjusted their water consumption behaviours to deal with water scarcity. Participants have indicated that they are using water sparingly by using the required portion for use and being aware not to waste or use water unnecessarily. Additionally, participants indicated that they avoid getting water directly from the tap but rather get water from their water storage facilities to avoid waste.

Moreover, participants made lifestyle changes to cope with water shortages. Some of the lifestyle changes include limiting how often they water their gardens, not watering their plants after rainfall, and using the water stored in their water containers instead of using water directly from the tap. Some participants also indicated that they avoid planting water-consuming trees and plants to save water.

5.3.5.3 Perceptions and experiences regarding water conservation

This section presents the participant's knowledge and experiences regarding water conservation. The section is divided into subthemes as extracted from the participants' narratives:

5.3.5.3.1 Knowledge of water conservation

Participants were asked to share what they understood about water conservation. The extracts below are from the participants' narratives:

"In my understanding, it is the practice of using water efficiently to reduce unnecessary water usage" (Participant 1).

"Water conservation refers to the way people use water and how we can protect and save water so that we can be able to have water even the following day. It involves conserving the water in other places for future use" (Participant 14).

"Water conservation means using water sparingly and not waste water" (Participant 15).

"It means that we must save and protect water by using minimal water as needed" (Participant 10).

"Water conservation means protecting this scarce resource because water is important and without water, we would die from thirst" (Participants 3 & 6).

"I think water conservation refers to the way we must take care of the water so that we can have water for longer periods. It is the way we must save and protect water" (Participant 20).

“Water conservation means we must take care of water so that we may have water for future use. It means that we must care for water and treat water like a scarce resource” (Participant 4).

“Water conservation implies that we must not waste water (Participant 7).

“Water conservation refers to the proper use of water” (Participant 11).

“Water conservation means taking care of water properly” (Participant 12).

“Water conservation means that everyone in the community must conserve water because water is life” (Participant 5).

Based on the above extracts, it appeared the majority of the participants had a good understanding and knowledge of what water conservation is. Participants indicated that water conservation comprised of efficient use of water, protection, and preservation of water for future use, as well as reduction unnecessary and wasteful use of water.

5.3.5.3.2 Experiences of participants regarding water conservation

The question “Kindly share with me your experiences about the conservation of water in your area” was asked and participants shared their observations and experiences as quoted below:

“In my village, there is a lot of waste of water. It seems people are doing it deliberately. Some people go to the extent of watering their lawn the whole night” (Participant 1).

“People here do not understand water conservation at all. People only start to be aware when there is no water available but on days when water is available people do not conserve water or think of its importance” (Participant 10).

“There is a lot of waste. It seems people are doing it deliberately. Some people go to the extent of watering their lawn the whole night” (Participant 2).

“In my view, I cannot say it is everybody who understands it. I think people are only cautious and save water when it is scarce but when it is plenty people simply open their taps without consideration of wasting a lot of water” (Participant 8).

“The thing is we are different and might not see this issue of water the same” (Participant 13).

“I don’t think people have a problem with conserving water, because of the little bit of water we have we make sure to use sparingly” (Participant 3).

“I think it is not a big percentage of people who understand the issue of water conservation. I think the majority does not understand” (Participant 11).

“I don’t think people understand the issue of water conservation. People do not wait until their water containers are full and monitor them, rather they open the tap and leave and the containers would be flowing with water” (Participant 17).

“I don’t often see people wasting water, it is very rare. I think we might have some knowledge about water conservation. Most of us attend to the taps when we see them open and wasting water” (Participant 14).

“I think people do understand the issue of water conservation and understand the importance of water, I have seen a lot of people disciplining kids that are not even theirs on the streets when they see their wastewater” (Participant 18).

“I think some do conserve water while others don’t. For example, right now if we have water, one must know that you fill up your containers and close the taps when done. But other people go to work and leave the taps open throughout the day” (Participant 12).

“According to me, it’s not a lot of people who understand this issue of water conservation and how to protect and save water” (Participant 20).

“Some people do conserve water. We are different as people. Some people do things purposefully and are wasteful” (Participant 16).

“I think the majority of people in my area do understand the issue of water conservation. It is only in rare cases where you will find a tap wasting water but if you talk to your neighbour that they are wasting water they do understand and would switch off the tap” (Participant 19).

“My experience has been that there is a lot of water wasting here in our village. You will find that a person has had the hosepipe connected to the communal tap the whole day and the street filled with water that is leaking from the pipe” (Participant 4).

“I think people in the community know about water conservation because sometimes I hear some people reprimanding children on the streets when they waste water and tamper with the taps. I suppose it also depends on people because we are different. Other people don’t take the issue seriously and would just leave children to play with water” (Participant 9).

Centred on the above extracts, it appeared that participants have had varying experiences regarding water conservation in the community. Some participants’ experiences were that there was a lot of water wastage and a lack of knowledge regarding water conservation in the community. Few participants thought that there was fair knowledge and effort from community members regarding water conservation. Moreover, participants acknowledged that adopting positive water conservation behaviours is also reliant on individual community members.

5.3.5.4 Behaviours that hinder water conservation

Participants were asked about practices they considered to hinder water conservation. The responses were categorised in several subthemes presented below:

5.3.5.4.1 Habits and poor decision-making

a) Negative water consumption habits

The majority of the participants expressed that water conservation is often hindered by the negative water consumption habits of community members. The participants' narratives are quoted below:

“We use water carelessly, we water our lawns unnecessarily, and wash our cars using hosepipes which waste a lot of water. We also should avoid planting trees like evergreen trees because they require a lot of water and rather plant trees such as fruits and vegetables that do not require a lot of watering” (Participant 10).

“Other people water their plants daily which I don't think to encourages water conservation, I think it is better to water your plants once a week” (Participant 6).

“Because we have a shortage of water in our community, people must be discouraged from having unnecessary plants such as green grass which require a lot of watering and that water can be used by someone to drink” (Participant 9).

“Since people want to see our gardens beautiful some of us will just leave the water running while watering their plants” (Participant 15).

“Sometimes people use big portions of their yards to plant fruits and vegetables and then use the communal water to water their plants which are meant for the benefit of the whole community as well as the livestock” (Participant 5).

“Some of the behaviours that wastewater is when people put their water containers on the communal taps to fill water and then leave them there without monitoring. You will find that the containers get filled up until the water starts flowing” (Participant 11).

“Sometimes we would open the tap over and over at the kitchen basin wasting water” (Participant 12).

“Some just leave the water running after filling their tanks” (Participant 19).

“Sometimes we fill up the big baths about 7 of them to do our laundry while the clothes are even small” (Participant 12).

“People also wastewater at the car wash places by using hosepipes to wash the cars. Other people also end up watering their lawns unnecessarily” (Participant 14).

“Some people would use big jugs or bottles to drink water and then they don’t finish the water and end up throwing it out, that is wasteful” (Participant 19).

“We just open taps and throw hosepipes all over the yards without monitoring the water usage” (Participant 10).

“We don’t use water as needed and measure how much is going to need, for example, people would fill in their buckets or jugs until they overflow” (Participant 18).

“Some behaviours that wastewater includes using hosepipes to water my garden instead of using a watering can. Other behaviours include when we use a hosepipe again to wash my car instead of using a bucket to wash the car” (Participant 20).

“Some unnecessary celebrations such as Spring Day where you find that in other places people spray one another with water. These behaviours wastewater” (Participant 3).

From the above extracts, it appeared that participants perceive certain habits as hindering the efforts of conserving water. The results indicated that the participants have developed habits that are contributing negatively to conservation efforts. Participants alluded to habits such as not measuring water needed for a specific use, not monitoring hosepipes when getting water from communal taps, using hosepipes

instead of water cans/buckets when watering plants and/ washing cars as well as watering gardens regularly.

b) Water consumption habits in children

Participants indicated children's negative water consumption habits that hinder water conservation. Below are the participants' narratives:

"Kids sometimes use big jugs to get water for drinking that they won't finish. They just take a sip and throw away the whole jug, that is wasteful" (Participant 12).

"Sometimes children leave the taps open and play with water, spraying each other with water" (Participant 11).

"On their way from school children would open the taps and leave that tap like that without closing it. When the water is pumped later, it would just flow, if no one realizes quickly a lot of water would be wasted" (Participant 2).

"We also have small children in our households who can be very wasteful when it comes to water, playing with and unnecessarily using water" (Participant 9).

"Kids leave the taps open in the streets and water gets wasted" (Participant 4).

"Sometimes kids are very wasteful, they fill up water in the big baths and say they are swimming" (Participant 17).

The extracts presented above indicated that children's habitual water behaviours often lead to a lot of water wastage. The participants' narratives indicated that children at times play with taps, leave the taps as well as use water recklessly.

c) Poor decision-making

The majority of the participants highlighted that water conservation efforts are also hindered by poor decisions that people make when it comes to water-related matters:

“People leave taps open and when the water is eventually pumped sometimes at night, you will find that water has been flowing from the tap the whole night” (Participant 10).

“It is mostly children who wastewater, they always open taps and leave them open. It is worse during the night when water comes back and would flow for two meters, going to wasted” (Participant 1).

“Sometimes you will find that the communal taps are left open and when the water is pumped, the water just flows everywhere” (Participant 20).

“I think the water gets wasted the most on our communal taps on the streets. Because sometimes when kids pass by the taps, they just open the taps and leave them open” (Participant 16).

“Sometimes people just leave the water running from their taps or hosepipes” (Participant 15).

“The taps are on the streets, after school when children walk home, they would open a tap and there would be no water coming out. They would leave that tap like that without closing it. When the water is pumped, it would just flow, if no one realizes quickly that the water is being wasted, water would flow until far” (Participant 2).

“Some people, even kids, leave the taps open and water would be flowing throughout the street” (Participant 18).

“We also have small children in our households who can be very wasteful when it comes to water, playing and tampering with the taps” (Participant 9).

“It is a lack of responsibility as community members, we don’t think about who would take care of water if we don’t. No one will go close the tap. A few of us can stop and close the taps because we understand the importance of water” (Participant 6).

“There are people who after seeing that the tap doesn’t have water, they leave it open. When the water machine is operated and water is pumped you will see water just flowing on the road” (Participant 7).

“You will find that someone has opened the tap the whole day while they are not in the yard, then the water will be flowing and get wasted when they pump at 12h00” (Participant 7).

The extracts above showed that negative decisions such as leaving taps open hinder water conservation efforts. It appeared that some community members decide to leave the taps open after attempting to get water from the taps. The above extracts also appeared to suggest that poor decision-making such as leaving the taps open lead to a lot of water wastage when water is eventually pumped as water would flow all over the street.

5.3.5.4.2 Attitudes, Beliefs & Perceptions of water

a) Negative thoughts, beliefs & attitudes about water

When participants were asked what they thought were the general beliefs and attitudes toward water in their community, the following answers were provided:

“Sometimes people would tell you that you can’t tell them anything about water because no one owns water” (Participant 18).

“The community believes that water is plenty and that there is water everywhere and you can just pump water as you like and misuse water. This kind of belief would then not be in favour of water conservation” (Participant 3).

“When one tries to speak to the youth about good manners of preserving water you will be told that it’s their parents that are paying for the water. It is as if paying for water gives the child permission to wastewater” (Participant 2).

“Most people just think that if water is available, they just use it as they like and they do not understand that misusing water leads to the shortage of water in the future” (Participant 5).

“There are a lot of people who don’t conserve water in our community and even when you tell them of the importance of water conservation, they will tell you that you don’t own the water” (Participant 6).

“I think most people might not see water conservation as important and because there is no monitoring, people just use water as they please” (Participant 4).

“Some people see water to be in abundance and can use it carelessly without seeing the importance of conserving it” (Participant 8).

“I don’t it can be possible to control how other people use water because people will tell you that this is not your water and you don’t have authority on how they use it” (Participant 13).

“Perhaps it’s because we don’t even pay for this water, we look at water as freely accessible and we don’t care” (Participant 10).

“I think maybe it’s because previously water was in abundance and there were no shortages of water. Perhaps people still hold that belief that water is in abundance” (Participant 11).

From the above quotations, it is perceptible that people’s attitudes, perceptions, and beliefs about water affect their water consumption behaviours. The results showed that participants believe that some community members hold a belief and perception that water is in abundance, freely available, and is a public asset, therefore can be used in any manner. It appeared that these perceptions and beliefs translate to people not adopting behaviours favourable to water conservation.

5.3.5.4.3 Lack of accountability

a) Lack of responsibility for reporting leaking taps, pipes & hosepipes

Some participants expressed concern regarding the lack of responsibility in reporting and fixing leaking water supply infrastructure: Participants’ narratives are presented below:

“Some of the pipes are leaking and water gets wasted and therefore does not reach the intended people. A lot of the time we don’t report tap leakages and bursts on time, we just leave it like because perhaps it’s not mine, being ignorant of the fact that leaking tap will affect your access to water in the future” (Participant 10).

“Some communal taps would be leaking maybe because the tap is broken, what would you do or say because the tap is not in your yard” (Participant 1).

“Most of the time you find that the taps and hosepipes are broken and leaking, people do not take responsibility to fix them so that they don’t waste any more water” (Participant 19).

“Sometimes you find that the tap gets broken and because it is a communal tap, no one wants to take responsibility to fix it. The tap would go months not fixed and water is wasted because it may be leaking” (Participant 5).

“Sometimes you find that water is leaking from the communal municipality taps and the pipes burst and they are not fixed or attended on time” (Participant 3).

“People use hosepipes to get water from the communal taps and these hosepipes are often wasting water throughout the streets and they may have leaks and bursts due to being stepped on or ridden over by cars. If they are filling up a water tank before it fills up a lot of water has been wasted on the street” (Participant 4).

“Sometimes people use a pipe which is not properly secured or is leaking. So, water would be leaking from the tap or pipe” (Participant 6).

From the above extracts, it appeared that the lack of responsibility of community members negatively affects water conservation efforts in the community. It appeared that community members do not take responsibility for reporting leaking and burst water infrastructures such as pipes and taps. Additionally, it appeared that due to the taps being communal, people do not want to take the responsibility of reporting these leaks and bursts. Furthermore, the above extracts showed that at times people do not

take the responsibility of ensuring that the hosepipes they use to get water from communal taps are in good condition and not wasting water through leakages.

b) Inconsiderate behaviours or acts

A few participants highlighted that inconsiderate behaviour such as damaging or stealing communal water supply infrastructure negatively water conservation efforts:

“There are people stealing metal and copper tap heads, although the municipality is trying to change this and put plastic tap heads. They steal these copper taps to sell them. So, water gets wasted and flows throughout the night or for a couple of days before the taps are fixed” (Participant 5).

“The water tanks the municipality brought t are no longer working because people stole the taps multiple times until the contractor gave up. Now we don’t get access to water fairly because people think selfishly by stealing those communal taps and tap caps” (Participant 16).

“Even these communal taps get stolen because they are outside the yards and no one owns them, so people just take them” (Participant 4).

“Some people even go to the extent of breaking or stealing the tap tops/heads and water would be flowing” (Participant 7).

“There is so much waste of water in this area. I have experienced how taps are constantly damaged in the area” (Participant 2).

“I can’t tell you why, but some people break taps on our communal taps. I have no idea why someone would do that” (Participant 6).

Based on the above extracts, it appeared that inconsiderate acts negatively impact water conservation efforts. The damage and theft of water infrastructures such as copper taps and tap heads lead to waste of water in the community.

c) Lack of knowledge regarding water contamination

Few participants indicated that the lack of knowledge regarding water contamination leads to water sources being contaminated affecting water quality, availability, and conservation efforts:

“There is a lot of water pollution from things such as child nappies and condoms” (Participant 2).

“People use a lot of chemicals while cleaning their pit toilets that end up contaminating the groundwater” (Participant 3).

“Other ways that hinder water conservation include people dumping dirt in the rivers which end up contaminating water and affects the quality of water (Participant 10).

“We also pollute and contaminate water because our waste stays for a long time on the ground and the oils and dirt end up going underground, then polluting the groundwater (Participant 16).

“We often use harmful chemicals to keep our pit toilets from filling up and smelling. These chemicals are not good for the water underground. Most of us don't know that this is not good” (Participant 6).

Based on the extracts above, it appeared that the lack of knowledge regarding the effects of pollution on water sources and water quality. Participants indicated that behaviours such as dumping human waste and chemicals on the ground contaminate underground water sources as well as affect the water quality.

5.3.5.5 Behaviours and interventions to promote water conservation

This section presents subthemes of behaviours and interventions that promote water conservation as narrated by participants:

5.3.5.5.1 Water consumption and infrastructure monitoring

a) Monitoring water consumption behaviour

Some participants indicated the importance of individuals monitoring water consumption in the promotion of water conservation in their households and community:

“You can limit your water usage when you wash your car, you don’t use a hosepipe. People can use watering cans instead because you will limit the amount of water you use” (Participant 10).

“You can teach children to use cups to only need and limited water, not overfill the cups unnecessarily when getting water, and not spill water all over” (Participant 14).

“I think that we must consider using a bath instead of a shower because with the bath you can limit the amount of water you put in the bath, unlike the shower water that just flows. Even when I want to make a cup of tea, I must not fill up the kettle with water instead I must use water just enough for the tea. Because it may happen that when another person wants to also make tea for themselves later, may throw away that water thinking that it is old/dirty” (Participant 10).

“We can teach our children that when they are thirsty, they don’t have to use their hands when drinking from taps as water would spill everywhere, but they can rather use small containers or bottles” (Participant 7).

“Whenever I need to use water, I use water from the bucket and use enough water just to wash the dishes” (Participant 12).

“I think people need to pay attention when they are watering their plants, they must not just throw the hosepipe on the plants and leave it there without paying attention until water starts flowing everywhere” (Participant 16).

“I must ensure that I measure the water I want to use as needed so that to avoid using a lot of water when not necessary” (Participant 18).

“We use limited water when we use our modern bathing tubs, instead of filling up the tubs to the fullest. While I am busy watering my garden, I must use a watering can instead of just leaving a hosepipe unattended for about 30 minutes” (Participant 20).

“We make sure we use water sparingly by measuring and using water for what is needed” (Participant 13).

“People can instead use small cups to just get the water they need” (Participant 19).

“We can also use adequate/measured water for washing our clothes. We must not also take advantage of staying next to communal taps and use that as an opportunity to use water carelessly” (Participant 7).

“We can try to minimise how we use it so that we do not waste it. When we are two in the house, we can agree on how much we use for drinking and how much for bathing” (Participant 8).

Based on the extracts above, it is evident that monitoring water consumption behaviour can promote water conservation efforts. It is evident that participants think that people can monitor their behaviour to ensure water conservation such as measuring the water needed for specific consumption, using water cans or hosepipes to water their plants/gardens and when washing their cars; as well as monitoring that water does not overflow when using the hosepipes.

b) Collective monitoring of communal taps

A few participants indicated that the monitoring of communal taps should be a shared responsibility and collective effort among community members. The following answers below show this:

“Taps must always be closed If one finds running taps he must close them” (Participant 1).

“We must teach children to use the little water they get sparingly. So that they don’t leave the taps open and play with water, spraying each other with water” (Participant 11).

“We make sure that our taps are closed when not in use” (Participant 17).

“We must ensure that the taps remain closed at all times especially if we are not busy with watering our gardens or doing the washing” (Participant 19).

“If these taps were in the yards, there would be more responsibility and control. People have now resorted to putting their pipes for the communal pipes/ taps and having their taps in their yards.” (Participant 4).

“We must also agree as people who share communal taps, that the taps must always be closed so that even if the water is pumped at night, water must not just flow and go to waste” (Participant 20)

“As community members, we should take responsibility, we should be able to close the taps that are open and wasting water” (Participant 3).

“There are people from the municipality that will be driving around sometimes doing their own business and when they see that there are people who are wasting water they threaten to close the taps, take out the taps, or lock the taps” (Participant 19).

“Most of the time we have representatives from water affairs who do walkabouts around the village, they monitor water usage and have closed a lot of taps in the community that was wasting water” (Participant 16).

“I think maybe the tribal council should appoint people who are responsible for monitoring water usage in our villages” (Participant 12).

From the above extracts, it is evident that participants considered collective efforts of monitoring communal taps to be significant in promoting water conservation. The study revealed that participants think that community members can work together amongst

each other and with the local authorities to take the responsibility of monitoring the communal taps.

c) Monitoring and maintenance of water infrastructure

Participants indicated that regular monitoring and maintenance of water supply infrastructure can encourage water conservation as it may prevent water loss through leakages and bursts. The following excerpts indicate the participants' answers:

"I think the first thing is to ensure that you don't have to leak equipment as well as not carelessly opening taps and leaving them unattended" (Participant 4).

"We must ensure that all our taps are working well and maintained and there are no leakages so that we avoid unnecessary water going to waste" (Participant 5).

"The first thing would be to ensure that our infrastructure is in a good condition. Because once a pipe bursts or a tap is leaking, conserving water becomes difficult when there is a leakage" (Participant 10).

"... for the maintenance and repair of burst pipes, perhaps a Centre should be developed where such things could be reported. Because currently there is no where we report these things so you find that people would use rubber bands to try and tighten the taps and pipes which are not sustainable. Maybe we can develop street committees for water-related matters and they can deal with such things" (Participant 3).

"I think the good way of preserving water is to put some caps made of cans on our taps to prevent leakage" (Participant 1).

"We ended up deciding to use the small cans as lids and a padlock so that people don't open the taps and leave them open" (Participant 7).

A few participants indicated their wishes for the involvement of local authorities in providing, maintaining, and repairing water supply infrastructure:

“The municipality is responsible for their maintenance and fixing our taps here at Ga-Seleka. They have authority over the water services in our community because they are the ones that installed these communal taps” (Participant 5).

“One other thing the government can do is to repair the old pumps that were once functional and ensure that water does not leak from the pumps that are damaged” (Participant 8).

“The municipality must put permanent measures like putting in water pipes for people in the new stands so that people can have responsibility for the water instead of sharing the water tanks. No one wants to take responsibility for making sure that water is not wasted on communal water tanks or pipes” (Participant 16).

The extracts above indicated that participants' other manner to ensure the preservation of the little water available are through proper maintenance and fixing of the water infrastructure. Participants thought that water can be preserved by ensuring that the available infrastructure is in good condition to avoid wasting water. It also appeared that participants are advocating for collective and collaborative responsibility and accountability between the community and local authorities to ensure that the water infrastructure is taken care of.

5.3.5.5.2 Behavioural change interventions

a) Enhancement of knowledge regarding water conservation

When asked “Is there anything that can be done to encourage water conservation in the community”, the majority of the participants alluded to the need for educational programmes. The use of print and broadcast media, as well as word of mouth, was stated by participants as one of the ways that could assist in enhancing the community members' knowledge about water conservation:

“We need serious awareness campaigns and community meetings to educate people about water conservation” (Participant 5).

“In town, sometimes they send out pamphlets to the residents to advise the residents at what times they should water their plants and when not to. People in town start to understand that they should not water their plants at which times and how to use water. Some of these things must also be in the villages where maybe they can promote water conservation” (Participant 11).

“I think the best way is for people to be taught. I think we can have a community meeting where people can be taught about water conservation and how people should use water appropriately. We must not take it lightly that people know, sometimes people need to be taught” (Participant 8).

“Someone can be elected per village to educate people about water conservation. Maybe that will help the community to understand the importance of water and that water is scarce even underground. And if this is done frequently, I think it will help people to realise that water needs to be saved and conserved” (Participant 14).

“People need to be taught about water conservation, people can be gathered in the community hall so that they can be given information about the importance of water and how to conserve water” (Participant 16).

I think we need to have community meetings to teach meeting about water conservation, and sometimes have sessions to remind people about the importance of water conservation” (Participant 19).

“There must be people who go around in the village to teach people about water conservation and the importance of water” (Participant 17).

“The distribution of information pamphlets or flyers about water conservation can help impart knowledge amongst community members” (Participant 20).

“I think some of the ways to promote water conservation in our communities would be door-to-door awareness campaigns mainly focused on teaching people about the preservation and conservation of water. Things such as walk-ins, door-to-door, seminars, and the use of print information. As well as

commemorating water days or water week, take information to the TV and radios.” (Participant 3).

“I think through community meetings where we are taught about water conservation perhaps that would help change our thoughts and ways towards the water. We must also consider that some people did not get formal education so we might know completely about water conservation” (Participant 6).

Based on the extracts above, it appeared that participants are advocating for programmes and interventions that will enhance community members’ knowledge regarding water conservation. Participants think that educational programmes can be important to restructure the cognitions community members have regarding water, water scarcity, and conservation. Moreover, participants advocated for programmes such as broadcast media which include print media, radio, and television media.

The study results further showed that these programmes can assist in the dissemination of information regarding water conservation to community members. Participants appeared to think that this approach can assist community members to notice their negative thinking patterns and behaviours toward water consumption leading to positive change. Furthermore, participants suggested programmes such as door-to-door awareness campaigns, seminars, use of community gatherings, and commemorations of important water days to raise awareness regarding the importance of water conservation.

b) Encouragement of positive behaviour toward water conservation

The following participants alluded to the importance of appreciating people’s participation in the educational programme to encourage positive behaviour:

“People who attend the seminars about water conservation must be given participatory certificates so that people can be encouraged and shown appreciation. I also have a participatory certificate from Kader Asmal when he was a minister of Water Affairs, I participated in one of the important meetings about water preservation” (Participant 3).

“The thing is even if I attend that seminar or workshop about water conservation, I won’t get anything, like a certificate to show that I have attended and have the knowledge” (Participant 9).

“People need to be encouraged to participate in water conservation things, appreciate people like give people things like attendance acknowledgment so that they can go recruit more people to come to attend. This will mean many people will get the information about water conservation” (Participant, 20).

“They also need to make these awareness campaigns about water fun, give people prizes for participating or getting certain information correct. So that more people can come to attend and learn more about water conservation” (Participant 10).

The extracts above indicated the importance of positively reinforcing behaviours by providing tokens of appreciation to people who participate in the seminars regarding water conservation. Participants suggested providing participatory certificates and prizes to individuals to encourage more participation in educational programmes and water conservation efforts.

c) Early childhood interventions

Some participants indicated the importance of introducing water conservation education to children. The narratives below are of participants who indicated the importance of teaching children about water conservation:

“We must teach our children about the importance of water on health and wellbeing of people. We must also teach them to take care of water and water properly” (Participant 12).

“We can also ask for permission to speak to the teacher and children at school about water conservation because children must be taught about water conservation and conservation” (Participant 2).

“Although it might be difficult to teach young children about water conservation, what you can do is teach them to use cups to only need and limited water, and not spill water all over” (Participant 14).

“We need to teach our kids the importance of water and about water conservation” (Participant 17).

“I think it should be generational, older people should disseminate this information about water conservation to their children. So that it becomes a norm that water is important and must be conserved” (Participant 3).

We need to sit our children down and teach them about the importance of water and water conservation. It should start in our yards” (Participant 18).

“We must start teaching our children here at home about water conservation” (Participant 2).

“I think we can achieve better conservation through training the younger generation about the importance of water, its scarcity, and water conservation” (Participant 20).

“I think across all the school curriculum water conservation should appear. Outreaches should be conducted in because our learners listen more when there is someone from outside teaching them” (Participant 3).

“If it is possible, even in our schools there could be incorporated in the curriculum to teach children about water conservation” (Participant 5).

Based on the above extracts, it appeared that participants think that early childhood interventions to impart knowledge regarding water conservation should be considered. The results further showed that a multi-disciplinary approach to promoting and imparting knowledge to children regarding water conservation would be beneficial. Participants also thought that incorporating information about water conservation in the schools' curriculum can facilitate the promotion of water conservation in children.

d) Modelling positive water-related behaviour to children

Participants highlighted the importance of modelling positive water consumption behaviours to children towards encouraging water conservation in the community. The participants' narratives are presented below:

“We must show our children how to use water sparingly. They must learn from us. If we don't do it, then from whom are they going to learn?” (Participant 11).

“We must also teach them to take care of water properly. We might have to even show them over and over but it is important” (Participant 12).

“Although it might be difficult to teach young children about water conservation, we must show use cups instead of hands when drinking from taps” (Participant 14).

“For children to take the issue of water conservation seriously, they must see us taking it seriously as well. So, we must show them through our actions that the issue of water conservation is important” (Participant 17).

“We must teach our children at home about the importance of water and how to use water sparingly” (Participant 7).

The participants' narratives presented above indicated that modelling positive water consumption behaviour can promote water conservation in the community. Participants indicated that adults need to model behaviour that promote water conservation to teach their children about water conservation.

e) Ongoing reminders regarding water conservation

Participants also indicated that the community members need ongoing reminders about water conservation and that the local authority can get involved in this matter:

“I think that the Chief's council should call a community meeting to educate people about water conservation and water shortage in our village” (Participant 7).

“The tribal council can also regularly engage the community on the matter, they can use the headmen to engage with us and occasionally relay the messages about water conservation” (Participant 14).

“They can make use of the local tribal authority, people listen to the tribal council and their instructions are usually followed. They can play a crucial role in assisting with the conservation of water” (Participant 3).

“You see, there is a funeral tomorrow, when they ask for a representative from the royalty or tribal council, they can use the opportunity to now let the community know about water conservation. Just to pass the message, although they won’t engage because it is a funeral, so the best place would be at the tribal council meeting so everyone can engage and ask questions” (Participant 2).

“I think the local authorities can help by arranging information sessions for community members because I think we need to be informed regarding water conservation, about water usage and ways we can conserve water” (Participant 20).

“The relevant departments can also do roadshows where they give people pamphlets and teach them about water conservation. They can also run peer groups, teaching them about conservation of water so that these people can also go out there and teach the community members” (Participant 3).

Based on the extracts above, it is evident that ongoing reminders may encourage water conservation efforts among community members. The results showed that the use of community gatherings to remind community members of the importance of water conservation is encouraged. Participants indicated that the local authority such as the chief and headmen can utilise their authority and remind community members about water conservation during community gatherings.

5.3.5.5.3 Regulation of water consumption

a) Water-use behaviour regulation and monitoring

Some participants indicated the importance of monitoring community members' water-use behaviours to promote water conservation:

“Water is not regulated well in our communities, they should install the meter boxes, maybe when there is money involved people will realise that they can't just use water as they please” (Participant 10).

“I think it would be better if the government install water meter boxes. Perhaps if there is the monitoring of water use like that people might start taking the issue of water conservation seriously. People will pay for the water they use. I acknowledge that it would be a great disadvantage for people who do not have any financial means unless these can be made reasonably affordable for everyone. We know some households do not have any source of finance totally, so yes, they might be disadvantaged (Participant 12).

“If we want to regulate water use in our community and improve water conservation, perhaps we should put a tap in each household and then install water metre boxes which will help keep people accountable for water usage in their yards. People would then pay according to the amount of water they use” (Participant 14).

“The difference between us people in the village and people from the townships is that they use metre boxes there, once you open your tap the meter box starts billing. Perhaps if they can install metre boxes also for us, people can start saving water and being cognizant of how much water they use” (Participant 17).

“I think the best way is to install water meter boxes just like in towns so that people's water usage can be monitored and everyone who is using water carelessly can pay as they use. Perhaps if there are meter boxes installed people will take more responsibility to use water well” (Participant 4).

“The taps must be 2 metres away from the gate in your yard, with water metres to the bill. I would be able to conserve water because I would be billed for my water usage. This would encourage water conservation a lot” (Participant 2).

“If each household gets a tap in their yard, metre boxes should also be installed. People would know that if they have used a lot of water then they are going to pay an amount fit for their water usage. This would help so much in the regulation of how people use water. It will help us adopt more positive behaviours of conserving water. Although this might disadvantage those that are less fortunate, people will know and learn that if I leave my tap open and close it I am going to pay a lot of money” (Participant 20).

“I think if we can have water metre boxes so that limits for water usage can be regulated. This can also assist to sensitise people to their water usage behaviours and being aware when they waste water. Not that people would pay, but just to make people aware of how much water they are using” (Participant 11).

The extracts above indicated that another manner to encourage water conservation could be through monitoring the water-use behaviours of community members. From the extracts above, it shows that participants suggested that this could be achieved through installing devices such as water metre boxes to sensitise community members to their water-use behaviours as well as encourage positive water consumption behaviours. Some participants indicated that the metre boxes can be installed solely for monitoring and encouraging positive water use behaviours instead of expecting community members to pay for the water as this would negatively affect disadvantaged households.

b) Discouragement of negative water consumption behaviour

Participants indicated that behaviours that negatively affect water conservation efforts needed to be discouraged. As illustrated in the narratives below, participants indicated that these behaviours can be discouraged through punishment and rules:

“The tribal council can make decisions to fine people for the misuse of water and wasting water” (Participant 3).

“Announcements about water conservation can be made at community meetings and things like fines can be introduced for people who continue to wastewater.” (Participant 12).

“I think after there has been a law put in place that everyone must conserve water, the people can be disciplined if they continue wasting water” (Participant 4).

“I think people should be disciplined or fined when they misuse water. Maybe as a community can agree on how much people can be fined” (Participant 6).

“We can try to put down rules about how water should be used in our communities but these will need to be emphasized and enforced because some people would just break those rules” (Participant 14)

“We must also agree as people who share a communal tap, that the taps must always be closed so that even if the water is pumped at night, water must not just flow and go to waste” (Participant 20).

“We could agree that around 19h00 and 20h00 the main water supply should be closed to deny those who water their lawns in the evening access to water” (Participant 1).

“I think there must be an agreement that water should be pumped between 12h00 and 17h00 so that people who waste water at night do not get the chance to do so” (Participant 8).

The extracts presented above showed that participants thought that it would be beneficial for the local authority to discourage behaviour that negatively impacts water conservation efforts. The introduction of fines seems to be one of the ways suggested as a form of punishment for people who are engaging in negative behaviour.

Furthermore, participants suggested the development and introduction of rules and curfews for when water could be pumped to discourage water wastage.

PART B: Psychological descriptions and interpretation

This section presents the emerging themes from the interviews. The sections also present the psychological descriptions of participants' narratives. The main three key psychological descriptions that emerged are as follows: a). psychological effects of water scarcity amongst participants; b). coping strategies to deal with water scarcity; c). perceptions and experiences of water conservation; d). Behaviour that hinders water conservation, and e). Behaviour that promotes water conservation. The table below gives an illustration of these psychological descriptions:

Table 6 Psychological descriptions of water scarcity and water conservation

Themes	Psychological descriptions
Meanings participants attach to water	<ol style="list-style-type: none"> 1. Symbolism 2. Significance-based meanings
Psychological effects of water scarcity	<ol style="list-style-type: none"> 1. Emotional distress <ol style="list-style-type: none"> a) Feelings of frustration, hopelessness, and helplessness b) Feelings of shame and embarrassment c) Feelings of anger and resentment d) Feelings of disappointment 2. Interpersonal conflicts 3. Disruption of activities in daily activities of living
Coping strategies	<ol style="list-style-type: none"> 1. Adoption of alternative behaviour 2. Behavioural adjustments
Perceptions and experiences of water conservation	<ol style="list-style-type: none"> 1. Knowledge of water conservation 2. Experiences of water conservation

Behaviours that hinder water conservation	<ol style="list-style-type: none"> 1. Habits and poor decision making 2. Attitudes, perceptions, and beliefs about water 3. Lack of responsibility
Behaviours that promote water conservation	<ol style="list-style-type: none"> 1. Monitoring water consumption behaviour 2. Enhancing water conservation knowledge 3. Encouraging positive water conservation behaviours 4. Early Childhood interventions 5. Water-use behaviour regulation and monitoring 6. Discouraging negative behaviours

5.4. Meanings participants attach to water

5.4.1 Symbolism

It emerged from the narratives that water represented life and purification to participants. Participants attached meanings to water based on how they perceive and use water. The symbolic meaning of water was also spiritual as some participants recognised the role of water for cleansing purposes. Water is regarded as life or a source of life by the majority of participants.

5.4.2 Significance-based meanings

The study findings showed that participants attached the importance and meaning of water to its significant role in their survival. The majority of participants indicated that they use water for significant daily activities such as drinking, cooking, bathing and grooming, cleaning, and sanitation purposes. It was also apparent from the extract above that participants also use water for agricultural purposes such as irrigation and their livestock.

5.5 Psychological effects of water scarcity on participants

5.5.1 *Emotional distress*

The study findings indicated that water scarcity and shortages in the community cause significant emotional distress to participants. Below are the psychological effects of water scarcity on participants:

5.5.1.1 Feelings of frustration, hopelessness, and helplessness

Feelings of frustration regarding the long periods that the community goes without water emerged from the participants' narratives. The study results revealed that participants felt frustrated and helpless that their water rights have been violated. Unmet expectations and unfulfilled promises by authority figures appear to exacerbate these feelings. Feelings of frustration and helplessness regarding the financial effects of water scarcity are also apparent. Some participants expressed feelings of helplessness regarding spending money to drill boreholes whilst other participants showed feelings of frustration regarding buying water from people who have boreholes.

5.5.1.2 Feelings of shame and embarrassment

The findings of the study also indicated that participants experienced feelings of shame associated with traveling long distances and queueing for long periods to access water. Feelings of embarrassment regarding the effects of water scarcity on the participants' daily activities such as grooming and bathing were also evident.

5.5.1.3 Feelings of anger and resentment

Feelings of anger that water was not being equally and fairly distributed in the community also emerged. Feelings of anger towards the unfair distribution of the available water amongst the community were also apparent. The inability to receive water due to the geographical locations of their households, unmaintained, old water infrastructure as well as theft of water infrastructure appeared to worsen the feelings of anger and resentment. Underlying feelings of resentment amongst community members also emerged as other participants feel unfairly treated because the

available water is not distributed fairly. Furthermore, the findings of the study displayed that feelings of resentment are also towards local authorities for the available water not reaching all community members equally due to old infrastructures.

5.5.1.4 Feelings of disappointment

The narratives showed that participants experienced feelings of disappointment towards local authorities regarding the unfair distribution of water particularly due to old water infrastructure that has not been upgraded to cater to the growing population and newer sections of the area. Feelings of disappointment also appear to be about the illegal connection of water infrastructure such as pipes on communal taps by other community members. These feelings are also related to the theft and damage of water taps and caps on communal taps by other community members.

5.5.2 Interpersonal conflicts

It has emerged from the narratives that interpersonal conflicts arise amongst community members from the negotiations regarding sharing the available water. The study findings indicated that conflicts also arise between community members and neighbouring villagers who get access to water from their communal taps occasionally.

5.5.3 Disruption of daily activities of living

The narratives indicated that water scarcity affects the participants' activities of daily living. Participants' daily activities of living such as bathing, cleaning, washing, and grooming are affected as participants can go weeks without water. As indicated above, these have caused psychological distress for participants as they have experienced feelings of embarrassment being unable to perform their daily activities of living.

5.6. Coping strategies

The study results revealed that participants have developed various coping mechanisms to deal with shortages of water in their community:

5.6.1 Adoption of alternative behaviours

The narratives from the participants indicated that they have adopted new behaviours to cope with water shortages. Participants have opted to store water in tanks, buckets, and various water containers to have more water to use in times of need. The study showed that to preserve water for longer periods, participants are also recycling water by using used water to water plants, and clean and rinse clothes and dishes. Furthermore, the study findings indicated that participants are harvesting rainwater to deal with water scarcity in the community. Participants have opted to harvest rainwater to have more water for consumption as well as to use in times of need. Participants also indicated that they have opted to drill boreholes to cope with water scarcity in their area and to have easy access to water in their private spaces.

5.6.2 Behavioural adjustments and lifestyle changes

The study results indicated that participants have adjusted their water consumption behaviours to deal with water scarcity. Participants indicated that they were using water sparingly by using the required portion for use and being aware not to waste or use water unnecessarily. Participants also indicated that they are recycling the water to preserve the available water instead of using water once. Furthermore, participants indicated that they avoid getting water directly from the tap but rather get water from their water storage facilities to avoid waste.

Participants have also adjusted their gardening behaviours by limiting how often they water their gardens as well as opting not to water their plans after rainfall. Moreover, participants made lifestyle changes to cope with water shortages. Some of the lifestyle changes include avoiding planting water-consuming trees and plants to save water.

5.7 Perceptions and experiences of water conservation

5.7.1 Knowledge of water conservation

The study findings showed that participants possessed a satisfactory comprehension and awareness regarding water conservation. Participants described water conservation as the efficient use of water, protection, and preservation of water for future use, as well as reducing unnecessary and wasteful use of water.

5.7.2 Experiences of water conservation

Participants had varying experiences regarding water conservation in the community. Some participants' experiences were that there was a lot of water wastage and a lack of knowledge regarding water conservation in the community. Few participants thought that there was fair knowledge and effort from community members regarding water conservation. Participants also acknowledged that adopting positive water conservation behaviours is also reliant on individual community members.

5.8 Behaviours that hinder water conservation

5.8.1 Habits and poor decision making

The results indicated that there are negative habitual behaviours developed by both adults and children are contributing negatively to conservation efforts. Participants alluded to habits such as not measuring water needed for a specific use, leaving taps open and not monitoring hosepipes when getting water from communal taps waste a lot of water. Furthermore, habits such as using hosepipes instead of water cans/buckets when watering plants and/or washing cars and watering gardens regularly also hinder water conservation. The study findings showed that poor decision-making hinders water conservation efforts. Poor decisions such as leaving taps open after not finding water from the taps lead to a lot of water wastage when water is eventually pumped as water would flow all over the street.

5.8.2 Attitudes, perceptions, and beliefs about water

Some participants reported that people's attitudes, perceptions, and beliefs about water affect how they use water. The participants' narratives showed some community members have negative beliefs and perceptions that water that leads to water being misused and wasted. Participants indicated that some community members believe that water is in abundance, freely available, and is a public asset, therefore can be used in any manner.

5.8.3 Lack of accountability

Participants reported that some community members do not take responsibility for reporting leaking and burst water infrastructures such as pipes and taps. The findings of the study indicated that due to the taps being communal, people do not want to take the responsibility of reporting the leaks and bursts. The participants' narratives also showed that at times people do not take the responsibility of ensuring that the hosepipes they use to get water from communal taps are in good condition and are not torn or leaking. Participants also reported that there is no accountability for communal taps because they are often damaged and stolen because no one takes responsibility for them.

5.9 Behaviours and interventions to promote water conservation

5.9.1 Monitoring water consumption behaviour

It is noticeable from the findings of the study that monitoring water consumption behaviour can promote water conservation efforts. Participants reported that community members can monitor their water consumption behaviours by measuring the water needed for specific consumption, using water cans or hosepipes to water their plants/gardens and when washing their cars; as well as monitoring that water does not overflow when using the hosepipes. Participants also indicated that monitoring water consumption can also be a collective effort. Participants reported that community members can work together amongst each other and with the local authorities to take the responsibility of monitoring the communal taps.

5.9.2 Enhancing water conservation knowledge

The findings of the study revealed that knowledge enhancement programmes and interventions are greatly important in promoting water conservation. Participants indicated that cognitive restructuring can be achieved through educational programmes. Various broadcast media interventions which include print media, radio, and television media were highlighted by participants. Other interventions to enhance the community's knowledge about water conservation included door-to-door awareness campaigns, seminars, and commemorative important water days. The

study results showed that these programmes can assist in the dissemination of information regarding water conservation to community members; as well as lead to behavioural change as community members notice their negative thinking patterns and behaviours towards water consumption and conservation.

5.9.3 Encouraging positive water conservation behaviours

The participants' narratives showed that positive reinforcement through providing tokens of appreciation to people who participate in the seminars regarding water conservation is important. Participants suggest providing participatory certificates and prizes to individuals to encourage more participation in water conservation programmes and water conservation efforts. Additionally, constant and ongoing reminders were perceived to be important in encouraging positive water conservation behaviours. Participants indicated that community gatherings and meetings could be utilised as an opportunity for local authorities (headmen, chief) to reiterate and remind the community regarding the importance of water conservation.

5.9.4 Early childhood interventions

The study results indicated that early childhood interventions to impart knowledge regarding water conservation should be considered. The study findings revealed that children's water consumption habits often lead to a lot of water wastage. The participants' narratives indicated that children at times play with taps, leave the taps as well as use water recklessly. It is evident from the participants' narratives that imparting knowledge to children regarding water conservation would positively impact water conservation efforts.

Moreover, participants indicated that educating children about water conservation requires a multi-disciplinary approach. Participants also thought that incorporating information about water conservation in the schools' curriculum can facilitate the promotion of water conservation in children. In addition, the study findings showed that modelling positive water consumption behaviour can promote water conservation in the community. Participants indicated that adults need to model behaviour that promote water conservation to teach their children about water conservation.

5.9.5 Water-use behaviour regulation and monitoring

Participants indicated that monitoring the water-use behaviours of community members can promote water conservation. Participants' narratives showed that the installation of water metre boxes can sensitise community members about their water-use behaviours and patterns. The study findings showed that the monitoring of water consumption behaviours through water metre boxes can assist community members to develop pro-conservation behaviours.

5.9.6 Discouraging negative water-use behaviours

Participants thought that it would be beneficial for the local authority to discourage behaviour that negatively impacts water conservation efforts. From the narratives, it appeared that the discouragement of negative water consumption behaviour could be achieved by introducing fines as a form of punishment. This method of operant conditioning could assist community members to associate their negative water consumption behaviours with a consequence (fine). The development and introduction of rules and curfews for when water could be pumped to discourage water wastage, particularly at night.

5.5 Concluding remarks

This chapter demonstrated the themes and subthemes that came out of the study. The findings of the study showed the extent of water scarcity in the Ga-Seleka area. Furthermore, the results indicated that water scarcity in the area had major psychological effects on community members. Additionally, the financial and relational implications of water shortages were alluded to. The findings revealed that participants attached significant meanings to water such as symbolic and use-based meanings. Moreover, participants indicated diverse experiences regarding water conservation in the community. Furthermore, the results indicated that participants have developed coping strategies to deal with water scarcity. Coping strategies such as having water storage, recycling water, harvesting rainwater, drilling boreholes, and making behavioural adjustments were apparent. The findings indicated behaviours that hinder water conservation include poor water consumption habits and decision-making,

negative attitudes, beliefs, and perceptions about water as well as lack of accountability. Additionally, the findings of the study showed that behavioural change programmes and interventions can be beneficial to the promotion and encouragement of water conservation. Educational programmes and regulation of water consumption behaviours were indicated as one of the interventions that can promote water conservation. The following chapter presents a discussion of the study results in the context of the relevant literature.

CHAPTER 6: DISCUSSION OF STUDY RESULTS

6.1 Introduction

The chapter presents a discussion of the study findings concerning the literature review. The themes and subthemes presented in the previous chapter will guide the discussion of the study results. The discussion will be in six main parts:

- a) Meaning participants attach to water
- b) Psychological effects of water scarcity on participants
- c) Copings strategies used by participants to deal with water scarcity
- d) Participants' experiences of water conservation
- e) Behaviours that hinder water conservation
- f) Behaviours that promote water conservation

6.2 Meanings attached to the water

6.2.1 *Symbolic meanings*

It has emerged from the study findings that water represented life and purification to participants. Participants attached meanings to water based on how they perceived water. Furthermore, it appears that water is regarded as life or a source of life by the majority of participants. Symbolically, to some participants, water has purification abilities and it is often used as such, that is, for spiritual purposes to purify and cleanse. Alike to the findings of the study, Coetzee et al (2016) identified that water has spiritual and cultural meanings in some African communities and was perceived as a way to create contact with ancestors, and vital for performing spiritual rituals such as cleansing before and after funerals and churches. Behailu et al. (2016) also indicated that in African communities, people's physical and spiritual well-being are strongly linked to water. Different religions, cultures, and social groups depend on water and have strong spiritual connections with water as a means of purity before their Gods. In addition, Zenani and Mistri (2005) reported that from an African perspective water is important, not just for social and economic reasons but it also has cultural and spiritual significance. Olokesusi (2006) further indicated that in most African rural

communities, the spiritual dimension of water and water conservation has been acknowledged.

6.2.2 Significance-based meanings

The study findings revealed that participants attached the importance and meaning of water to its significant role in their daily activities and survival. Most participants indicated that they use water for vital daily activities such as drinking, cooking, bathing and grooming, cleaning, and sanitation purposes. Participants further indicated that they also use water for agricultural purposes such as irrigation and their livestock. Correspondingly, Coetzee et al. (2016) found that amongst other things water is used for basic needs such as bathing, cooking, personal hygiene, flushing toilets, laundry, and gardening). Olokesusi (2006) also indicated that water could be used for many purposes such as drinking, laundry, livestock, cooking, and irrigation farming. In line with the findings of the study, Tshabatau (2020) found that women in Kweneng District (Botswana) consume water for different necessary activities such as cooking, washing, clean, and bath. Water is a valuable resource that is used for a variety of purposes including drinking, cooking, bathing, recreation, gardening, agriculture, industry, and environmental preservation (Oageng & Mmopelwa, 2014). In addition, Bertule et al. (2018) stated that water is central to the sustainable functioning of the ecosystems, meaning, it is vital for agricultural production, energy generation, industrial production, and domestic use.

6.3 Psychological effects of water scarcity

6.3.1 Emotional distress

The study findings revealed that water scarcity and shortages in the community cause significant emotional distress to participants. Feelings of frustration regarding long periods that the community goes without water emerged from the study results. Similarly, Khodarahimi et al. (2014a) found that the prevalence of mental health problems, stress, and worry is significantly higher in rural residents with water shortages. Additionally, Coêlho et al. (2004) reported that individuals in the areas with water shortages had significantly higher levels of emotional distress than individuals

in the no-drought areas. The findings support the assertions by Sartore (2007) who indicated that prolonged drought is a serious stressor for rural communities and may lead to emotional distress, worry, and increased irritability. Khodarahimi et al. (2014b) added that emotional reactions to water shortages in rural regions include anguish, pessimism, mental distress, anger and irritability, guilt, and being overwhelmed by negative emotions. Some participants reported to be spending money to drill boreholes and buying water from people who have boreholes which carry financial expectations. Additionally, unmet expectations and unfulfilled promises by local authority figures appear to exacerbate these feelings experienced by participants. Consistent with the study findings Thomas and Godfrey (2018) found that emotional distress regarding the water-related issues was linked to the cost of getting water. This is because many homes in Southern Africa still do not have piped-in water, so household members must get water from standpipes, buy it from vendors, or incur the costs of drilling boreholes. Thus, a greater proportion of household income may need to be spent on water delivered from private sources, such as tankers, to supplement the lack of water locally. (IPCC, 2001; Majuru, 2015; Ziervogel, 2018).

The findings of the study further showed that participants experienced feelings of shame associated with traveling long distances and queueing for longer periods to access water. Feelings of embarrassment regarding the effects of water scarcity on the participants' daily activities such as grooming and bathing. These supported the findings by Bulled (2017) who found that people felt distressed and embarrassed about their water shortage situations and regarding wasting time or money to acquire water. The results are also consistent with the findings by Tshabatau (2020) who found that women in the Kweneng district (Botswana) have experienced feelings of embarrassment due to altered bathing routines and skipping showers as a result of water shortages. Moreover, Hove et al. (2019) found that water shortages were a significant source of personal unhappiness, stress, and embarrassment for community members who had to continually collect water.

Feelings of anger, disappointment, and resentment that the available water was not being equally and fairly distributed in the community emerged from the study results. Participants' inability to receive water due to the geographical locations of their households as well as old and unmaintained water infrastructure appeared to

contribute to the feelings of anger and resentment. The study results further showed that the feelings of disappointment and resentment towards local authorities regarding the unfair distribution of water particularly were due to old water infrastructure not being upgraded to cater to the growing population and newer sections of the area. In line with the study findings, Pamla et al. (2021) found that in Makhanda (Eastern Cape) the increasing proportion of the population combined with poor rainfall patterns resulted in the reservoirs not being capable to meet the rising water demand because they were historically meant to supply water to few households. Consistently, Taing et al. (2019) also reported that the residents of Cape Town lashed out in anger at the City for not effectively planning for the severe drought from 2015 to 2018. Similarly, Pamla et al. (2021) reported that people attributed water scarcity in Makhanda to the municipality's failure, to invest in the upkeep and extension of current water infrastructure in the face of expanding population and water demand, as well as to address water leaks. It appears that the lack of proper maintenance of water systems and infrastructure by authorities in most places altered water availability in ways that increased bother and distress (Khatri & Vairavamoorthy, 2007; Mushavi et al., 2020; Pearson et al. 2015).

The study results further indicated that feelings of disappointment are also associated with the illegal connection of water infrastructures such as private pipes and the theft and damage of water taps and caps on communal taps by other community members. Similarly, Peal (2014) expressed a concern that the acts of vandalism and theft of valuable water supply tools such as metal pipes and fittings lead to increased operation and maintenance costs (that is, repair or replacement of vandalised pipes) and reduced access to a suitable quantity and quality of water. Additionally, Theodory and Ndunguru (2013) also reported that unauthorised water connections cause a lot of water loss and affect the provision of water to households that are connected formally.

6.3.2 Interpersonal conflicts

It has emerged from the participants' narratives that water scarcity can result in interpersonal conflicts among community members. These could be a result of the negotiations regarding sharing the available water. Consistent with the study results,

IPCC (2001) reported that water scarcity or changes to the accessibility of water have the potential to increase conflict amongst communities and different sectors. It appears that the constraint on water resources increases due to the competing demands of private, agricultural, and industrial uses for water. Thus, water scarcity and insecurities may precipitate interpersonal conflicts over water, between users at the local and regional levels within countries (Ohlsson, 2000; Pearson et al., 2021). Similarly, Mukuhlani and Nyamupingidza (2014) found that in Bulawayo (Zimbabwe) water restrictions and shortages led to conflicts as residents from Nketa 9 flocked to Nketa 7 with containers to secure water. Moreover, Mushavi et al. (2020) further indicated that excess water demand at public water sources frequently caused verbal and physical disputes and conflicts among people in the queue. In agreement with the findings of the study, Hove et al. (2019) found that there was an increase in conflicts and tension among households over mobile water tankers and who gets water first.

The participants indicated that water shortages have also led to relational issues and conflicts with neighbouring villagers who occasionally have access to water from their communal taps. UN-Water (2007) echoed these findings by reporting that water shortages may worsen the conflict in existing water-stressed areas among local communities competing locally for access to natural springs and rivers, as well as lead to conflicts on a larger international transboundary scale between countries sharing a very limited and essential resource. Additionally, Pamla et al. (2021) reported that the disproportionate impact of water scarcity on vulnerable groups can be a source of conflicts among communities.

6.3.3 Disruption of activities of daily living

The study findings showed that water scarcity affects the participants' activities of daily living. Participants' daily activities of living such as bathing, cleaning, washing, and grooming are affected as participants can go weeks without water. Similar to the study results, Tshabatau (2020) found that bathing and showering routines for women in the Kweneng district were altered as a result of water shortages in the area. In addition, Mushavi et al. (2020) indicated that fetching water from far water resources disrupted or took over people's daily schedules and disorganised the chores. Hove et al. (2019) further reported that water shortages were disruptive for community members who had

continually collected water. Moreover, Mushavi et al. (2020) reported that water insecurity made it difficult for some women to maintain good hygiene, which potentially jeopardized their standing with others in the community.

6.4 Coping strategies used by participants to deal with water scarcity

6.4.1 Adoption of alternative behaviour

Participants indicated that they have adopted new or alternative behaviours to cope with water shortages. The findings revealed that participants have opted to store water in tanks, buckets, and various water containers to preserve water for longer periods and water to use in times of need. Similar to the study findings, Adeniji-Oloukoi et al. (2013) found that households in Oke-Ogun (Nigeria) employed water storage and handling as one of the coping strategies to protect drinking water after collection from water points or sources. Additionally, Tshabatau (2020) found that another coping strategy adopted by households in Kweneng District (Botswana) is storing water in tanks and buckets for later use. Mukuhlandi and Nyamupingidza (2014) also discovered that residents in Bulawayo stored water in buckets and other available containers to deal with water shortages.

The study results further showed that to preserve water, participants are also recycling water by using used water to water plants, and clean and rinse clothes and dishes. Similar to the participants of the current study, Mukuhlandi and Nyamupingidza (2014) reported that residents in Bulawayo did not throw away bathing and washing water, but used it to flush the toilet and for other household chores. Consistently, Rodda et al. (2016) indicated that water re-use in both rural and urban environments is a critical technique for overcoming the water scarcity crisis in South Africa. In addition, Adeniji-Oloukoi et al. (2013) found that households in the Oke-Ogun region also employed adopted water reuse to cope with water insecurities. Moreover, Tshabatau (2020) found that households in Kweneng district (Botswana) reused water for water plants, washing toilets and cleaning the house to cope with water scarcity. Mushavi et al. (2020) also found that residents in rural Uganda developed some household water management strategies such as recycling or rationing water.

It is apparent from the study findings that participants are also harvesting rainwater to deal with water scarcity in the community. Participants have opted to harvest rainwater to have more water for consumption in times of need. Agreeing with the study findings, Olokesusi (2006) stated that in most African countries, rainwater collection or harvesting is extensively practised for domestic consumption and to provide water for backyard gardens (farms), and domestic livestock. It appears that rainwater harvesting involves collecting rainwater from the building roofs and storing it for later use and is important to reduce the decline in groundwater levels and conserve water during the rainy seasons (Kumari & Singh, 2016; Mukuhlani & Nyamupingidza, 2014; Theodory & Ndunguru, 2013). Additionally, households reported harvesting rainwater during seasons of rain enhances their coping with water shortages as access to water increases (Adeniji-Oloukoi et al., 2013; Tshabatau, 2020). This is similar to the finding of the current study.

The study results further indicate that participants have also opted to drill boreholes to cope with water scarcity in their area as well as to have easy access to water in their private spaces. The results are consistent with the findings by Majuru (2015) who found that wealthy households cope with water scarcity by using strategies such as privately setting up boreholes in their yards and installing water storage tanks. Similarly, Theodory and Ndunguru (2013) found that water shortage has resulted in the residents of the Dar es Salam (Tanzania) area opting to drill boreholes to supplement the inadequate piped water. In line with the study findings, Mmbadi (2019) also found that community members in the Greater-Giyani municipality drilled boreholes to cope with inadequate water availability.

6.4.2 Behavioural adjustments and lifestyle changes

The study results indicated that participants have adjusted their water consumption behaviours to cope with water scarcity. Various behavioural adjustments were mentioned by participants. These include using water sparingly by using the required portion for use and being aware not to waste or use water unnecessarily. Furthermore, some participants indicated that they avoid getting water directly from the tap but rather get water from their water storage facilities to avoid waste. The study results concur with the findings by Pamla et al. (2021) who found that people in Makhanda

(Eastern Cape) have adopted water-saving practices such as flushing the toilet only when necessary (instead of after each use), doing laundry once a week, and minimising daily water consumption in different home tasks. Furthermore, Marandu et al. (2010) noted that behavioural adjustments can assist conserve water by minimising the amount of water a person uses. These include turning the water off during brushing teeth and while washing vegetables; turning the shower off while applying soaping; starting the machine only when it is full to save water, as well as repairing and reporting leaks to authorities.

The study results showed that participants some participants made lifestyle changes to cope with water shortages. Some of the lifestyle changes include limiting how often they water their gardens, not watering their plants after rainfall, and using the water stored in their water containers instead of using water directly from the tap. The study findings also indicated that participants avoid planting water-consuming trees and plants to save water. Similar to the study findings, various researchers reported different lifestyle changes reported across communities to cope with water scarcity. For example, lifestyle changes were observed by Khodarahimi et al. (2014b) in Fars province in Iran. Residents of Fars Province made behavioural changes such as reducing water usage, not using water for car, yard, and carpet washing, decreasing the frequency of bathing, and overruling the traditions and actions of excessive water usage. In addition, Tshabatau (2020) found that households have changed water usage routines to preserve the little water available by opting to bath once daily. Moreover, in Dar es Salaam, households came up with a strict water budgeting strategy to cope with water shortages. Clean and safe water is mainly used for necessary household consumption such as drinking and cooking whilst some household water consumption activities considered less important such as washing clothes and mopping are skipped (Theodory & Ndunguru, 2013).

It also appears that residents of Cape Town were forced to use water sparingly and change their water consumption ways in their households due to incidences of water scarcity in the city (Matikinca et al., 2020; Mukuhlani & Nyamupingidza, 2014). In line with the findings of the study, the city of Cape Town introduced severe restrictions to facilitate behavioural adjustment. These included determining how often gardens, parks, and sports fields could be watered, and prescribing methods of watering (use

of buckets and water cans) with the hope of reducing water consumption (Muller, 2017). Similarly, Makhanda municipality advised residents to adjust their water consumption behaviours by using water sparingly, switching taps off while brushing teeth, flushing toilets only when necessary, limiting laundry to one load weekly, using plugs in water basins when rinsing dishes to encourage water recycling (Pamla et al., 2021).

6.5 Participants' experiences in water conservation

6.5.1 Knowledge of water conservation

The study findings showed that some participants had a good understanding and knowledge of water conservation. Additionally, participants expressed that water conservation is important. Most participants described water conservation as the efficient use of water, protection, and preservation of water for future use, as well as reducing unnecessary and wasteful use of water. The study results resonated with the definition of water conservation by FAO (2012) which defined water conservation as the protection and efficient management of freshwater resources to ensure their long-term sustainability. Similarly, Kumari and Singh (2016) indicated that water conservation included improved water management practices that reduce or enhance the beneficial use of water measured by action, behavioural change, device, or process implemented to reduce water loss, waste, or use. In addition, Sarabia-Sánchez, et al. (2014) indicated that knowledge and problem awareness are key aspects of environmental behaviour, particularly concerning water conservation efforts.

Previous literature showed that knowledge about water demand and conservation issues assists individuals to make informed decisions about conservation and may encourage pro-environmental behaviour (Aprile & Fiorillo, 2016; Dean et al., 2016; Mathipa & Le Roux, 2009; Rashid & Mohammad, 2012; Stern, 2000). Furthermore, Moglia et al. (2018) suggested that the first step toward a household deciding to conserve water is that they understand the importance of water conservation and that they know what to do to reduce water demand.

6.5.2 Participants' experiences of water conservation

It has emerged from the study findings that participants had varying experiences regarding water conservation in their community. Some participants' experiences were that there was a lot of water wastage and a lack of knowledge regarding water conservation in the community. A few participants thought that there was fair knowledge and effort from community members regarding water conservation. Participants also acknowledged that adopting positive water conservation behaviours is also reliant on individual community members. Similarly, varying experiences were reported by multiple authors, for example, Ideas42 (2017) found that although some community members in Berlen Municipality (Costa Rica) were cognisant of the need and significance of conserving water, only a few students saw it as a personal responsibility. Furthermore, Anderson et al. (2006) found that a small fraction of South Africans purify their drinking water or consider water pollution a serious issue. In addition, Onyenankeya and Salawu, (2018) pointed out that in South African rural communities, water conservation is not perceived as a social priority.

6.6 Behaviours that hinder water conservation

6.6.1 Habits and poor decision-making

The results indicated that there are negative habitual behaviours developed by both adults and children contributing negatively to conservation efforts. Participants alluded to habits such as not measuring water needed for specific use and not monitoring hosepipes when getting water from communal taps wastes a lot of water. Furthermore, habits such as using hosepipes instead of water cans/buckets when watering plants and/or washing cars and watering gardens regularly also hinder water conservation. Poor decisions such as leaving taps open after not finding water from the taps lead to a lot of water wastage when water is eventually pumped as water would flow all over the street. Similarly, Fielding et al (2012) indicated that the water consumption habits of individuals could be a barrier hindering the translation of intentions into actions. In addition, Gule et al. (2018) found that habits have significant effects on consumers' intention to conserve water. In support of the study findings, Mathipa and Le Roux (2009) also found that residents in Steelpoort (Greater Tubatse Municipality) wasted

a lot of water by washing cars using hosepipes, using excessive amounts of water for cleaning floors, rinsing clothes, cooking and flushing and using hosepipes to clean paved areas instead of sweeping the area. Additionally, Mathipa and Le Roux (2009) found that water wastage was also due to people leaving taps running, taps not closed properly in schools, residences, and outside areas, as well as learners playing fun games with water and drinking water from cupped hands instead of using cups. Fielding et al. (2012) reported that water consumption habits can be positive (such as turning off taps when brushing teeth) or negative (such as taking long showers).

6.6.2 Attitudes, perceptions, and beliefs about water

The study results suggested that people's thoughts, beliefs, and attitudes regarding water have a great impact on water conservation. Participants indicate that beliefs such as water being plenty and in abundance which are held by some community members affected water use and conservation behaviours. Consistently, Coetzee et al. (2013) indicated that the interaction of humans with water involves the perceptions and beliefs that individuals hold about water, as well as the specific behavioural and consumption practices they engage in, concerning available water resources. In support of the study results, Onyenankeya et al. (2015) found that the attitude of college students to water conservation is influenced by the belief that water is abundant in South Africa. Additionally, Gule et al (2018) found that individuals who have a positive attitude toward water conservation have a positive intention towards conserving water. Furthermore, Willis et al. (2011) found that found residents who had very positive water conservation and environmental attitudes saved more water than those with moderately positive attitudes. In this approach, Lee and Tanusia (2016) indicated that when aggregated; attitudes could manifest into a behavioural intention. This implies that the more positive the attitude and the stronger the more inclined people towards performing the desired behaviour.

Aprile and Fiorillo also found that when an individual believes that general environmental difficulties pose a threat to his or her group's welfare but not to the welfare of others, he or she will not save water. In addition, Onyenankeya and Salawu (2018) indicated that in South African rural communities, water conservation is not perceived as a social priority. Moreover, Pamla et al (2021) found that the residents of

Makhanda municipality's views that the municipality has failed to provide water for them may negatively impact their motivation to engage in water-saving behaviours.

The study findings revealed that other community members thought that water is a public asset, not owned by anyone, and freely available. Participants indicated that these beliefs and thoughts are not favourable to water conservation efforts. Similar to the study findings, Kohler (2016) indicated that water management strategies are an extremely sensitive topic in most communities because water has traditionally been regarded as a public good. Additionally, Olokesusi (2006) pointed out that in most African countries, surface water bodies are regarded as common property resources and all community members are entitled to equal rights and access and use of the water.

6.6.3 Lack of responsibility/accountability

Participants reported that some community members do not take responsibility for reporting leaking and burst water infrastructures such as pipes and taps. The findings of the study indicated that due to the taps being communal, people do not want to take the responsibility of reporting the leaks and bursts. The participants reported that at times people do not take the responsibility of ensuring that the hosepipes they use to get water from communal taps are in good condition and are not torn or leaking. Participants also reported that there is no accountability for communal taps because they are often damaged and stolen because no one takes responsibility for them. Similar findings were reported from other studies (Anderson et al., 2006; Ideas42, 2017) wherein only a few members of the community viewed water conservation as a concern or their responsibility. Consistent with the findings of the study, Mathipa and Le Roux (2009) found that community members in Steelpoort (Greater Tubatse Municipality) lacked a sense of ownership and felt indifferent about the state of the water sources/systems which led to theft and vandalism. Residents also paid no attention to leaking pipes and taps and rarely attempted to repair leaks or dripping taps as it was perceived to be the responsibility of the authorities. even when and if reported to the local authorities.

Pamla et al (2021) also found that the residents of Makhanda municipality felt that it's the municipality's responsibility to improve their competency in water provision and management and this may negatively impact their motivation to engage in water-saving behaviours. Additionally, Onyenankeya et al. (2015) found that although most college students consider water conservation to be necessary, they do not think water conservation is of great importance and is their responsibility. Furthermore, Ralo et al. (2000) found there is a general dissatisfaction with the current system of communal taps because there is no accountability, control, or monitoring over individual use of the taps.

6.7 Behaviours that promote water conservation

6.7.1 Monitoring water consumption behaviour

It emerged from the study findings that monitoring water consumption behaviour can promote water conservation efforts. Participants reported that community members can monitor their water consumption behaviours by measuring the water needed for specific consumption, using water cans or hosepipes to water their plants/gardens and when washing their cars; as well as monitoring that water does not overflow when using the hosepipes. In line with the study findings, Mathipa and Le Roux (2009) suggested strategies to conserve water in the home and use it in a responsible and sustainable, which included behaviours such as taking a shower instead of bathing and using a bucket instead of a hosepipe to wash the car. Similarly, to encourage water consumption monitoring, the City of Cape Town banned the use of hosepipes for gardening and encouraged residents to use buckets or watering cans instead. Using municipal water for washing cars was also banned (Parks et al., 2019; Muller, 2017).

Participants indicated that monitoring water consumption needs to be a collective effort. Participants reported that community members can work collectively with each other and with local authorities to take responsibility for monitoring water consumption on the communal taps. Consistently, Fielding et al. (2012) reported that water consumption is a unified behaviour, this includes water consumption measures of numerous household and community members. If one person is committed to

conserving water, unless other members are not similarly committed, that individual's attitudes are unlikely to result in reduced household water use. Additionally, Thakur et al. (2019) reported that it is important to involve communities in water conservation strategies so that they feel they formed part in finding solutions to water-related concerns. Furthermore, Ralo et al. (2000) found with the current system of communal taps was disappointing because there is no control and monitoring over individual use of the taps.

6.7.2 Enhancing water conservation knowledge

The findings of the study revealed that knowledge enhancement programmes and interventions are greatly important in promoting water conservation. Participants indicated that cognitive restructuring can be achieved through educational programmes such as various broadcast media interventions which include print media, radio, and television media. Other interventions to enhance the community's knowledge about water conservation that were mentioned by the participants included door-to-door awareness campaigns, seminars, and commemorations of important water days. The study results suggested that these programmes can assist in the dissemination of information regarding water conservation to community members; as well as lead to behavioural change among community members. Consistent with the study findings, Wright et al., (2012) suggested that communication about water quality and quantity is crucial to promoting water services and conservation in the country. Education and awareness interventions consist of providing information materials such as handouts, newsletters, newspapers, advertising campaigns, posters, television, radio, and magazines (Wright et al., 2012; Grill & Curtis, 2019). Literature shows that educational awareness programmes have a positive influence on improving the adoption of water-saving behaviours and reducing levels of consumption. This is because the first step toward a household's decision to conserve water is recognising the necessity of water conservation and knowing what to do to minimise water demand (Espineira & Valinas, 2013; Jury & Vaux Jr, 2007; Moglia et al, 2018).

The findings of the study are supported by various authors (Clark & Finley, 2007; Meizen-Dick & Rosegrant, 2001; OECD, 2017) who stressed the importance of

ongoing water conservation programmes (education, social marketing, and public awareness campaigns) to ensure that sustainable water conservation habits are created and to reinforce a positive attitude towards water conservation. Similarly, in the Eastern Cape Province, Nelson Mandela Bay municipality initiated a 'Water Wise Campaign' which targeted the public and media sources, as well as roadshows to inform the public about the conservation and management of water (World Cup Legacy Report, 2011). Furthermore, Matikinca et al. (2020) that an increase in water restrictions, as well as the Day Zero communication and awareness efforts, influenced changes in residents' water use behaviours in Cape Town.

Grilli and Curtis (2019) further clarified that the approach of awareness and education assumes that changing attitudes or enhancing knowledge may trigger new behaviours. In the same approach, Dean et al. (2016) found that greater water knowledge was associated with the adoption of water-saving behaviours confirming the importance of community knowledge in water management initiatives. In contrast, Ideas24 (2017) indicated that simply raising awareness of the need for water conservation was not going to be enough to change behaviour, but it is vital to assist people to form concrete intentions to reduce their water consumption through the incorporation of other interventions.

6.7.3 Encouraging positive water conservation behaviours

The findings of the study revealed that positive reinforcement strategies through providing tokens of appreciation to people who participate in the seminars regarding water conservation are important in conservation promotion efforts. Participants suggested providing participatory certificates and prizes to individuals to encourage more participation in water conservation programmes and water conservation efforts. Similar to the findings of the study, Grilli and Curtis (2019) indicated that another way to encourage pro-environmental behaviours is through incentives such as material compensation for individuals that engage in the desired behaviour. This could include monetary incentives (such as cash bonuses, discount fees etc.) or non-monetary incentives (such as gifts, certificates, coupons etc.). Additionally, the European Union (2011) advocated for economic incentives such as subsidising the public, offering co-funding and loans to encourage the adoption of good water management practices

and changes in water consumption patterns. The European Union (2011) also added that rewarding mechanisms and environmental incentives such as tax rebates, prizes, training, naming and providing certificates to competent water consumers can encourage sustainable and good water consumption amongst communities.

The results of the study further revealed that constant and ongoing reminders were important in encouraging positive water conservation behaviours. Participants indicated that community gatherings and meetings could be utilised as an opportunity for local authorities (headmen, chief) to reiterate and remind the community regarding the importance of water conservation. Consistently, Pamla et al. (2021) indicated that platforms for engagement amongst municipal authorities and community members are a necessity to address issues related to water, such as leakages, burst pipes and the provision of appropriate water quality and supply. Moreover, Malzbender et al. (2005) argued that customary or traditional water management structures play an important role in the overall water management framework in South Africa. These customary structures can provide a vehicle to ensure sustainable water resource management at the grass-roots level and close the void caused by inefficient government organizations. In support of the study findings, Thakur et al. (2019) found that the use of existing structures such as ward councillors for more communication and education regarding water conservation and preservation is vital to influence residents' water consumption behaviours. In addition, Grilli and Curtis (2019) stated that outreach and relationship-building programmes such as workshops, training, and community engagement activities (e.g. focus groups and public events) and highly effective when coupled with robust stakeholder and inter-community relations.

6.7.4 Early Childhood interventions

The study results indicated that early childhood interventions to impart knowledge regarding water conservation would positively impact water conservation efforts. The study findings revealed that children's water consumption habits often lead to a lot of water wastage. Participants reported that children play with taps, leave the taps as well as use water recklessly. Similar to the study results, Mathipa and Le Roux (2009) found that learners often play fun games with water and that they also need to be educated at schools about the conservation and management of water. Furthermore,

children are more likely to waste water especially when bathing or doing laundry, thus, environmental education is key to increasing knowledge in children as well as improving attitudes, resulting in changes in behaviour (Damerell et al., 2013; Thomas and Godfrey, 2018). In this approach, the North American Association for Environmental Education [NAAEE] (2010) indicated that environmental education in early childhood is important and it focuses on developmentally appropriate conservation concepts and building a foundation that will allow for positive regard and appropriate action later in adulthood.

Participants indicated that educating children about water conservation requires a multi-disciplinary approach. Participants also thought that incorporating information about water conservation in the schools' curriculum can facilitate the promotion of water conservation in children. The study findings support the suggestion made by Martínez-Borreguero et al. (2020) that multidisciplinary approaches regarding water conservation must be included in the primary school curriculum, to instill the youngest children with knowledge about the correct use and conservation of water. Martínez-Borreguero et al. (2020) further found that it is necessary to emphasise water content focused on education for sustainability from the earliest ages. Middlestadt et al. (2001) found that students who were exposed water conservation curriculum were more likely to carry out these behaviours frequently. Furthermore, Thakur et al. (2019) reported that residents in Waterloo Township (Kwa Zulu Natal) advocated for the education of school children to learn to appreciate the value of water with the hope to change their behaviour towards water conservation.

Schools need to recognise the importance of allowing students to learn more about the environment and its natural resources, as well as nurture pro-environmental behaviour and skills that can be carried over into adulthood (Mathipa & Le Roux, 2009). Nevertheless, Mathipa and Le Roux (2009) also found that although the Revised National Curriculum Statement (RNCS) in South Africa includes structures for developing environmental awareness, knowledge, and skills at the school level, there are still significant gaps in learners' understanding and knowledge of environmental issues. The study findings further showed that modelling positive water consumption behaviour, particularly among children, can promote water conservation in the community. Participants indicated that adults needed to model behaviour that

promotes water conservation to teach their children about water conservation. Correspondingly, Nazneen and Asghar (2018) found that parental modelling plays a significant role in influencing young people's pro-environmental attitudes and behaviour. The statement by Grilli et al. (2019) that social influence and modelling are particularly influential on people's behaviour to adopt pro-environmental behaviours also concurs with the study findings. Parents can instill pro-environmental attitudes and behaviour in their children by showing and modelling the very same behaviours themselves (Nazneen & Asghar, 2018). Additionally, Matthies et al. (2012) discovered parents that who engage their children in everyday pro-environmental behaviours serve as role models for specific pro-environmental home behaviours. Moreover, Gronhoj and Thogersen (2012) suggested that parental influence on their children's tendency to act in favour of the environment is significant and that parents are important role models for the transmission of pro-environmental practices to the youth.

6.7.5 Water-use behaviour regulation and monitoring

Participants reported that monitoring the water-use behaviours of community members can promote water conservation. The study findings suggested that the installation of water metre boxes could sensitise community members about their water-use behaviours and patterns as well as assist community members to develop pro-conservation behaviours. Consistently, Yang et al. (2016) suggested that there is a need for a persuasive technology approach that assumes that human behaviour and attitudes may be influenced by technology. This approach focuses on technology-human persuasion to change, shape or reinforce users' attitudes and/or behaviour to encourage pro-environmental behaviour. In support of the study findings, the OECD (2017) also stated that besides behavioural interventions, water consumers need water meters to match and track their water consumption. Furthermore, Bertule et al. (2018) indicated that it is possible to use meters that are not coupled to pricing charges in rural settings at communal wells or taps to detect and pinpoint leakages and provide information about consumer behaviour that can be used in water conservation campaigns. Randall and Koech (2019) clarified that although water meters are often used for urban water management and billing purposes, the recent Smart Water Metering (SWM) technology (Australia) which is used to measure water use, can be

used to provide consumers feedback regarding their water consumption data, in turn, enhancing water conservation behaviours.

6.7.6 Discouraging negative behaviours

The study findings revealed that discouraging negative water consumption behaviour is important in water conservation promotion. Some participants thought that it would be beneficial for the local authority to discourage behaviour that negatively impacts water conservation efforts. The results showed that the discouragement of negative water consumption behaviour could be achieved by introducing fines as a form of punishment. This technique of operant conditioning could assist community members to associate their negative water consumption behaviours with a consequence (such as a fine). Similarly, OECD (2017) indicated that reward and punishment schemes such as public rewards for households attaining particularly high-water savings, and fines for water squanderers can promote water conservation. Consistent with the study findings, the city of Cape Town introduced fines for transgressions and installed water restriction devices for non-compliant residents, to discourage behaviours that negatively affected water conservation efforts (Muller, 2017). Moreover, Parks et al. (2019) reported that the City of Cape Town introduced water restrictions and fines of between R1,000 and R10,000 throughout the water crisis in 2017-2018, which were used as punishment for transgressive behaviour and high consumption households. Furthermore, the European Union (2011) also indicated that penalisation through fines and higher taxes is thought to discourage excessive water consumption, pollution, and environmental damage. In addition, Hoehn (2011) indicated that penalties can be effective if fines are strictly enforced and offenders of water conservation efforts are made to pay.

Participants also expressed the need for the development and introduction of rules and curfews for when water could be pumped to discourage water wastage, particularly at night. The study results are similar to those of Shan et al. (2015) who found that in Greece and Poland, water conservation strategies such as obligatory water limitations and water price adjustments influenced the majority of people. Furthermore, Baloi (2020) reported that Polokwane municipality opted to introduce water shedding in the city and surrounding areas following the water crisis and the

municipality being unable to provide residents with water 24 hours a day. Consistent with the study results, Lindsay and Supski (2017) found that residents in Brisbane and Melbourne, Australia, were significantly influenced by water restrictions and curfews to reduce their water consumption and embrace more sustainable water practices. Additionally, Matikinca et al. (2020) reported that water restrictions are an efficient way to cut down on residential water consumption. In contrast, Hoehn (2011) indicated that whilst restrictions may lower a specific behaviour, they have little effect on water waste in unrestricted use.

6.8 Concluding remarks

This chapter highlighted multiple similarities between the present study's findings and the reviewed literature. As outlined throughout the chapter, the literature supports the findings that community members attach different meaning to water and water scarcity has various effects. In addition, the study findings on how community members cope with water scarcity were supported by various authors. The behaviours that hinder and promote water conservation were also supported by the literature. The following chapter presents the psychological model developed from the study.

CHAPTER 7: TOWARD A PSYCHOLOGICAL MODEL FOR WATER CONSERVATION

7.1 Introduction

This chapter proposes and explains a psychological model informed by the participants' narratives. The findings of the study revealed the perceptions of community members of the Ga-Seleka area towards water conservation. The participants in the study were community members who relied on communal taps to access water in the rural community of Ga-Seleka in Lephalale municipality. The findings of the study showed participants have various meanings they have attached to water and these influenced their water consumption behaviours. Additionally, the results showed that participants experience significant emotional distress as a result of major water shortages in the area. The results revealed that participants also experienced interpersonal conflicts and disruptions in their daily activities of living due to water scarcity. Moreover, the study results indicated that participants have developed coping strategies to deal with water scarcity in the area. Participants' experiences regarding water conservation in the area were also clear from the study findings. Furthermore, the results revealed various behaviours that hinder water conservation, as well as interventions that promote water conservation.

As outlined in Chapter 3 (methodology), the four-step guidelines by Wacker (1998) were followed in the development of a psychological model for water conservation. To develop the model, major concepts and sub-concepts are defined. The researcher further specified domains to which the model applies. As per discussion in chapter 4 (Research methodology), Wacker's (1998) guidelines that follow four steps guided the development of an informed psychological model of water conservation. The crucial concepts and sub-concepts forming the basis of the study were defined and the domain and application of the model were also specified. The model's various concepts and specific domains were then used to build a relationship. Finally, the researcher had to develop model predictions based on the connections amongst the concepts and backed up by the vases in this study.

7.2 A psychological model for water conservation

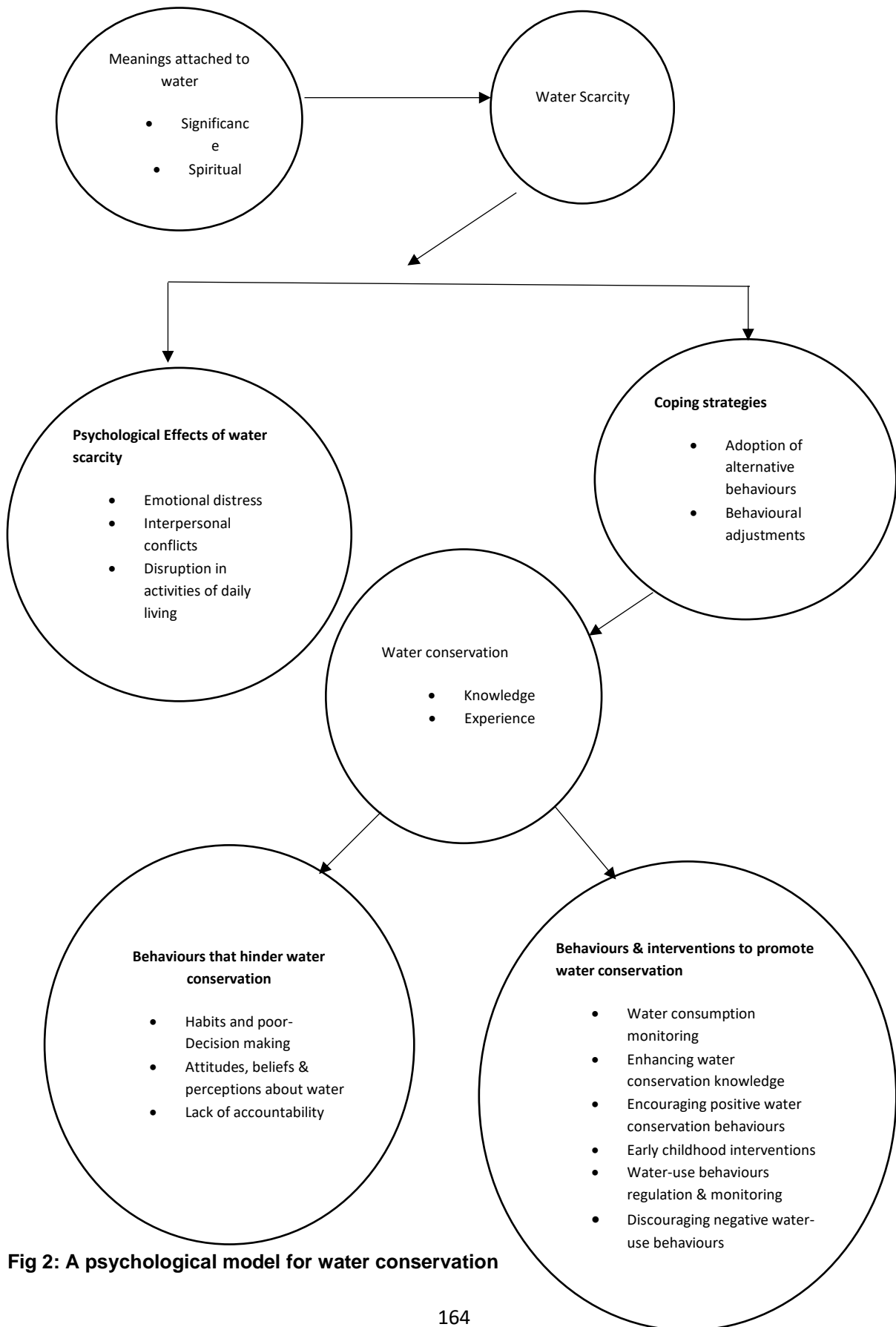


Fig 2: A psychological model for water conservation

7.2.1 Description of the model

7.2.1.1 Major concepts of the model

The ideas obtained from the Value-Belief Norm (VBN) theory are integrated into the model proposed. VBN proposes that people's worldviews as influenced by their values and beliefs affect their pro-environmental behaviours. The theory proposes a causal relationship between values, beliefs, norms, and behaviour. It implies that when a person holds long-lasting beliefs and ideals about preserving the environment, it leads to personal norms and pro-environmental behaviour. Individuals' values and beliefs are informed by attitudes, views, perceptions, and worldviews regarding the environment. Additionally, from the Afrocentric perspective spirituality is important and this approach calls for a change of the worldview to encompass all attributes of human existence, with an emphasis on African experiences. Using Afrocentric methodologies in research involves investigating Africana phenomena to develop a culturally accurate and intimate understanding of African reality and also providing descriptions and explanations of an African phenomenon. Both these theories (VBN and Afrocentricity) suggest that people's worldviews, values, and beliefs are significant determinants of behaviour.

a) Meanings attached to the water

These are meanings and significance participants have attached to water based on their perceptions and use of water.

b) Psychological effects of water scarcity

These refer to the effects of water scarcity on people's mental health. Psychological effects may include emotional distress, interpersonal conflicts as well as disruptions in the activities of daily living. Emotional distress includes feelings of frustration, helplessness, shame, embarrassment, anger, and disappointment. These feelings are regarding various factors causing, contributing to, or perpetuating water scarcity and unequal access to water. The model highlights that interpersonal conflicts arise amongst community members with each other and with neighbouring communities from the negotiations regarding the sharing of available water. Additionally, the model

depicts that water scarcity affects the participants' activities of daily living such as bathing, cleaning, washing, and grooming as participants can go weeks without water to properly carry out these activities.

c) Coping strategies

These relate to various behavioural strategies that people have developed to deal with water scarcity in their communities. Coping strategies such as adopting alternative behaviours include using storage facilities, recycling water, harvesting rainwater, and getting private water sources to cope with water scarcity in their area. Behavioural adjustments and lifestyle changes, that people made to cope with water shortages include changing water consumption behaviours, avoiding getting water directly from the tap, and adjusting or restricting their gardening behaviours.

7.2.1.2 Sub-concepts of the model

The sub-concepts of the model include knowledge and experience about water conservation. These factors inform the perceptions of participants regarding water conservation and affect their water conservation abilities.

a) Knowledge about water conservation

This includes understanding and knowledge about what water conservation refers to and entails. People's decisions to conserve and preserve water are often reliant on their understanding and knowledge of the importance of water conservation and knowing what to do to reduce water consumption.

b) Experiences in water conservation

These refer to the encounters and observations regarding matters of water conservation. These experiences can vary from one person to another because the level of knowledge and concern regarding water conservation matters also differ among individuals.

7.2.2 Assumptions of the model

The proposed psychological model of water conservation has numerous essential assumptions: These are:

- a) Individuals have attached various meanings to water which affect their water consumption behaviours. These meanings people attach to water influence their water consumption use and behaviours. Meanings may be symbolic and/or maybe related to the importance of water in people's daily activities.
- b) Water scarcity has various psychological effects on people. Emotional distress is prevalent regarding water scarcity in communities. Emotional reactions towards issues of water scarcity include, but may not be limited to anger, disappointment, resentment, embarrassment, shame, and frustration. Water scarcity also affects interpersonal relationships as it may lead to conflicts among community members. There is also a disruption in people's daily activities due to water scarcity.
- c) People have put in place strategies to cope and deal with water scarcity. Coping strategies include adopting alternative or new behaviours and also adjusting their behaviours as well as making lifestyle changes.
- d) People's habits and decisions affect water conservation efforts. Negative habits developed by both adults and children contribute negatively to water conservation efforts.
- e) People's perceptions, thoughts, attitudes, and beliefs inform their pro-environmental behaviours. Therefore, negative attitudes, perceptions, and beliefs about water negatively affect water conservation.
- f) Lack of accountability regarding communal taps hurts water conservation. Communal taps are for the public and not owned by anyone, thus this can mean that no one takes responsibility to ensure that water is not wasted on these taps or that the leakages and bursts are reported timeously.
- g) Monitoring and regulating water consumption behaviours can promote water conservation. People can be more cautious when using water to monitor how and for what they use water. Regulation of water consumption can be achieved by introducing water metres that are not for billing purposes but purely to sensitise the community about their water use patterns.

- h) Various educational programmes can be used to enhance knowledge about water conservation. Educating children early about water conservation can affect their water consumption behaviours. The inclusion of water-focused content in school curriculums can assist teach children about water conservation earlier.
- i) Collective effort amongst community members is vital to promote water conservation. The traditional local authorities can also promote water conservation efforts amongst community members by using community gatherings and meetings.
- j) Introducing fines and water restrictions can promote water conservation. This means discouraging wasteful water consumption through punishment methods.

7.2.3 Propositions of the model

The suggested model's propositions are as follows:

- a) People have attached significant meanings to water and this affects their water consumption behaviours. Symbolically water is viewed to represent life, purity, and cleansing. Water is also perceived to be important to the daily survival of human beings as it is used for significant functions.
- b) Water scarcity challenges have psychological effects on people. The effects include emotional distress, interpersonal challenges, and conflicts as well as disruptions in activities of daily living.
- c) People have developed various ways to cope with water scarcity. People have adopted alternative behaviours, adjusted behaviours, and made lifestyle changes to cope with water scarcity.
- d) People engage in different behaviours that hinder water conservation. These include ongoing habits and making poor decisions regarding water use. People hold negative perceptions regarding water and do not take responsibility for communal taps.
- e) Various behaviours and interventions can be developed to encourage water conservation. Water consumption behaviours can be regulated and monitored to avoid waste of water at communal taps. People's knowledge about water conservation can be enhanced through educational and awareness

programmes. People's positive water consumption behaviours can be encouraged and negative behaviour can be discouraged. Interventions aimed at teaching children about water conservation also promote water conservation.

7.2.4 The Value-Belief-Norm theory and Afrocentric dimensions of the model

The model represents water conservation as perceived by the participants. The model highlights that people's attitudes, perceptions, and beliefs about water affect their water consumption habits. Some common beliefs and perceptions are that water is in abundance, freely available and is a public asset, and can be used in any manner desired. These negative beliefs and perceptions about water have a significant impact on water conservation as they may lead people to misuse and waste water. From an Afrocentric dimension, spirituality is at the core of the meanings, participants attached to water. Spiritually participants highlighted that water has symbolic meanings such as water being viewed to represent life or being a source of life and used for cleansing and purification purposes.

7.2.4.1 Behaviours that hinder water conservation

The model shows that negative habitual behaviours and poor decisions by both adults and children contribute negatively to conservation efforts. Habits such as not measuring water needed for a specific use, using hosepipes instead of water cans/buckets when watering plants and/or washing cars, leaving taps open, and not monitoring hosepipes when getting water from communal taps waste a lot of water.

Additionally, the model reveals that there is also responsibility amongst community members regarding the reporting of leaking and burst water infrastructures. People do not want to be responsible for reporting leaking taps and bursting pipes because the taps are communal. The communal taps are also often damaged and stolen because there is no one accountable for them. The model highlights that at times community members do not take the responsibility of ensuring that the hosepipes they use to get water from communal taps are in good condition and are not torn or leaking to avoid wasting water.

7.2.4.2 Behaviours and interventions to promote water conservation

The model depicts various ways and interventions that can promote water conservation. Monitoring water consumption behaviours can be done by measuring the water needed for specific consumption, using water cans or hosepipes to water their plants/gardens and when washing their cars; as well as monitoring that water does not overflow when using the hosepipes. These monitoring efforts can be carried out by community members individually, as a collective, and together with the local authorities to ensure waste is not wasted, particularly on communal taps.

The model reveals that knowledge enhancement programmes and interventions are greatly important in promoting water conservation. Various educational and awareness programmes can assist in disseminating information regarding water conservation to community members, encouraging behavioural change in community members to notice, and restructuring the cognitions of community members as they learn about their negative thinking patterns and behaviours towards water consumption.

The model also depicts that positive reinforcement and ongoing constant reminders are important in encouraging positive water conservation behaviours. The provision of appreciation tokens, participatory certificates, and prizes is vital to encourage more participation in water conservation programmes and water conservation efforts. Participants indicated that community gatherings and meetings could be utilised by the local authorities (headmen, chief) to reiterate and remind the community regarding the importance of water conservation.

The model further highlights that early childhood interventions to impart knowledge regarding water conservation are important as children often waste a lot of water in the community. Early childhood interventions such as incorporating information about water conservation in the schools' curriculum and modelling positive water consumption behaviour can facilitate the promotion of water conservation in children. The model also reveals that the water consumption behaviours of community members need to be regulated and monitored. Participants indicated that water metre boxes not for billing or pricing purposes can be installed to sensitise community

members about their water-use behaviours and patterns; as well as to encourage the development of pro-conservation behaviours. Furthermore, the model highlights multiple ways to discourage negative water-use behaviours by the local authorities. These ways include introducing fines, water restrictions, and curfews when water could be pumped to discourage water wastage, particularly at night.

7.3 Concluding remarks

This chapter presented the psychological model for water conservation. This model incorporates the Value-Belief-Norm theory and the Afrocentric approach. The Afrocentric approach provides an African view because spirituality regarding water in an African community is touched on. African spirituality regarding water may affect the water consumption of participants. On the other hand, VBN theory focuses on how the values, beliefs, and worldviews of participants affect and influence their pro-environmental behaviours such as water conservation. The assumptions and propositions of the model were also presented in the chapter. The next chapter displays the summary of the findings, contributions, implications, and recommendations from the study.

CHAPTER 8: SUMMARY OF FINDINGS, IMPLICATIONS, AND RECOMMENDATIONS

8.1 Introduction

This chapter will summarise the study findings together with the implications and recommendations of the study. Lastly, the chapter will present the limitations of the present study.

8.2 Summary of the research findings

The design of this chapter is directed by some objectives of the current study. Therefore, this chapter will present the answers to some research objectives both answers to some of the research objectives outlined in the first chapter, as well as presents some significant themes drawn out from the data. The present study shows that people perceive and use water for various activities which informs the meanings they attach to water. Notably, there are also significant water shortages in the Lephalale area which leads to various psychological effects. These shortages have led people to develop coping strategies to cope with water scarcity in the community. Additionally, it appears that people are knowledgeable about water conservation although there are still people in the community who engage in behaviours that negatively affect water conservation efforts. Moreover, the study showed that there are behaviours that community members engage in that hinder water conservation. Behaviours such as negative water consumption habits and poor decisions related to water use affect water conservation negatively. Negative attitudes and perceptions regarding water-related matters, including the lack of accountability also affect water conservation negatively.

8.2.1 Meanings attached to the water

The study revealed that people attach various meanings to water based on how they perceive and utilise water. Water represents life and has symbolic meaning to people. Some people stated that water can be used for spiritual purposes such as cleansing and purification. Additionally, some people attached meanings to water based on the significance of water in their lives and how they use water. For example, people viewed

water as significant for their day-to-day activities such as drinking, cooking, grooming, bathing, cleaning, sanitation, irrigation, and their livestock.

8.2.2 Effects of water scarcity

The study findings revealed that water scarcity and shortages have noteworthy effects on people. People experience significant emotional distress regarding various issues related to water availability, access, distribution, and provision. Various feelings such as frustration, helplessness, shame, embarrassment, anger, disappointment, and resentment were expressed and alluded to in the extracts presented in Chapter 5. Water scarcity has also been shown to lead to interpersonal conflicts arising amongst community members and with neighbouring villagers as a result of the negotiations regarding sharing the available water. Additionally, people's activities of daily living such as bathing, cleaning, washing, and grooming are disrupted as people can go weeks without water.

8.2.3 Coping strategies

As shown in the extracts under 5.3.1, people have created various coping strategies to deal with water scarcity. These strategies adopt new behaviours to cope with water shortages such as using various water storage to have more water to use in times of need. Some people recycle and re-use water to preserve water for longer periods. It was also stated that people are harvesting rainwater to have more water for consumption in times of need or supplement the little water available. Additionally, some are coping with water scarcity by drilling private water sources such as boreholes to have access to water easily in their private spaces. Other coping strategies include adjusting water consumption behaviours, using water sparingly, limiting how often gardens are watered, and avoiding planting water-consuming trees/plants.

8.2.4 Participants' Knowledge, perceptions, and experiences regarding water conservation

The study findings indicated that there was good comprehension and awareness of water conservation and its related issues. Although their understanding and views differed from individual to individual, from the extracts, it was apparent that people viewed water conservation as important. Water conservation was described as the efficient use of water, protection, and preservation of water for future use, as well as of reducing unnecessary and wasteful use of water. The study results, showed that people had varying experiences regarding water conservation in the community. Whilst some people thought that there was a lot of water wastage and a lack of knowledge regarding water conservation in the community, others thought that there was fair knowledge and effort from community members regarding water conservation.

8.2.5 Behaviours that hinder water conservation

The study results revealed that various behaviours hinder water conservation in the community. These include negative habitual behaviours by both adults and children, poor decision-making, and negative thoughts, beliefs, and attitudes regarding water and water conservation. Other behaviours that deter water conservation are lack of responsibility and accountability amongst the community in reporting leaking or burst communal water infrastructures, as well as using hosepipes that are in good condition to access water from communal taps. The results showed that there is also a lack of protection of communal taps often leading to vandalism or theft of these taps.

8.2.6 Behaviours and Interventions that promote water conservation

The findings of the study showed that some various behaviours and interventions promote water conservation. These include people monitoring their water consumption behaviours individually, as well as collectively. According to the study results, this can be achieved through people measuring the water as needed for specific consumption, using water cans or hosepipes to water their plants/gardens and when washing their cars; as well as working together with the local authority to monitor water consumptions on the communal taps. The findings of the study revealed that

other ways to promote water conservation include enhancing the knowledge of community members regarding water conservation. It was stated that various knowledge enhancement programmes such as broadcast media (print media, radio, and television media), door-to-door awareness campaigns, seminars, and commemorations of important water days can be used to disseminate information regarding water conservation to community members. These interventions are believed to be important in sensitising community members regarding their negative thinking patterns and behaviours toward water consumption and conservation.

Furthermore, the provision of tokens of appreciation, participatory certificates, and prizes to individuals to people who participate in the seminars regarding water conservation are important to encourage more participation in the water conservation programmes and water conservation efforts. Other interventions that promote water conservation include constant and ongoing reminders regarding water conservation to community members by the local authorities (Community leaders) during community gatherings. The study results also showed that early childhood interventions such as modelling pro-environmental behaviour, educating children, and incorporating information about water conservation in the schools' curriculum can facilitate the promotion of water conservation in children.

The study findings further revealed that monitoring the water-use behaviours of community members through the installation of water metre boxes (not for billing purposes) could sensitise community members to their water-use behaviours and patterns. Other strategies include discouraging behaviour that negatively impacts water conservation efforts through introducing fines as a form of punishment for people who engage in behaviours that wastewater. It was also stated that water restrictions such introduction of rules and curfews for when water could be pumped can assist to discourage water wastage.

8.3 Implications of the Study

The study highlighted that water is important in people's lives as shown by the meanings they attach to it. People hold beliefs, perceptions, and attitudes about water that affect their water consumption behaviours. These perceptions and attitudes also

affect the decisions people make regarding water-related matters, as well as their water-use habits. The major implication of this study is that there is a great need for the consideration of psychological aspects in the development of water management/conservation strategies and interventions.

8.3.1 Implications for policy-makers

The results of the current study can aid policymaking to develop a comprehensive understanding of the psychological factors affecting water conservation. The research findings can also assist in the development and execution of informed water management interventions and programmes. Additionally, this study provides healthcare workers insight into mental health difficulties in communities affected by water shortages and scarcity, as well as their coping strategies. This can assist healthcare providers who work in such communities to structure their interventions appropriately.

8.3.2 Implications for Practice

The proposed model of water conservation sheds light on various behaviours that can both negatively and positively impact water conservation. The model incorporates elements of the Value-Belief-Norm theory and the Afrocentric theory. The VBN theory provides a useful framework for understanding how people's values and beliefs influence their choices regarding pro-environmental behaviour. On the other hand, Afrocentric theory allows for a culturally-based understanding of how to perceive and use water. Several participants indicated that negative beliefs, perceptions, and attitudes people have about water hinder water conservation efforts. Additionally, other participants illuminated the importance of using the African tribal authority as authority figures in the community to promote water conservation efforts among community members.

Healthcare providers practicing in communities will get insight into values, beliefs, and norms that impact water conservation efforts and can develop ways to deal with them or advise the relevant authorities. They can develop interventions that will consider various factors such as African spiritual or cultural uses of water, and beliefs and

attitudes about water. Interventions in collaboration with the traditional African authorities such as the local headmen and tribal authorities can also be developed.

8.3.3 Implications for Theory

The model developed from the study proposes that people's views, perceptions, and attitudes affect their water consumption behaviours, habits as well as decisions related to water use. Therefore, the current study has contributed to the body of knowledge in Environmental and Conservation psychology, as well as theories related to pro-environmental behaviour. Additionally, the model proposes that water has spiritual meaning and uses for Africans. Traditional tribal authority figures can also play a vital role in the promotion of water conservation within the communities. This proposition from the model is aligned with the Afrocentric perspective which advocates for an understanding of concepts from an African context, as well as finding solutions that are relevant for Africans. Therefore, psychological interventions, in South Africa, aimed at people who identify as Africans must incorporate culturally specific services.

8.3.4 Implications for further research

Research in the fields of Environmental and Conservation Psychology in African rural communities is still in its infancy. It would be significantly beneficial to the rural communities, academic institutions, and government for knowledge to be developed in these fields. Considering that South Africa is comprised of multicultural societies and people of various living conditions and socio-economic statuses, it is necessary for research in our country to reflect all aspects. Future researchers could explore further the role played by traditional, cultural, and spiritual factors in shaping people's perceptions of water conservation as these were not fully expanded on, in this study. Moreover, future research could also expand the study to other rural communities in South Africa as this study was carried out on a smaller sample within a limited population in Limpopo province.

8.4 Limitations of the Study

There are a couple of limitations of the current study, one of them is the use of a small sample size. This implies that the study may not be a representation of all people who

rely on communal taps in Lephalale, thus, making it not generalizable. Importantly, the process of translating the raw data from Sepedi to English as well as from Setswana to English may have led to some of the original and rich data obtained from participants being omitted. Additionally, in this study, the demographics of participants such as educational and socio-economic status as well as gender were not considered during the process of analysis and concluding.

8.5 Recommendations

Based on the findings of the study, the following recommendations are made:

- Psychological support is to be provided to communities experiencing water scarcity, particularly community members presenting with mental health challenges.
- The authorities should consider psychological factors when developing water management programmes, strategies, and interventions. Psychology experts should be included and consulted when such programmes are developed.
- Further studies using larger samples should be undertaken, particularly in African rural communities. Consideration should also be given to the roles of gender, educational background, age, and socio-economic status in water conservation.
- It is further recommended that training institutions for psychologists and health care providers in South Africa consider introducing the fields of Environmental and Conservation psychology in their syllabuses.

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APPENDICES

APPENDIX 1a. Semi-structured interview guide- English version

Objective	Interview questions
<p>1. To determine the perceptions of community members in Lephalale area regarding water conservation</p>	<p>a) According to you, what is water conservation?</p> <p>b) Please tell me what you think about the conservation of water.</p>
<p>2. To investigate what community members in Lephalale area consider to be appropriate practices to facilitate and promote water conservation</p>	<p>c) What do you understand to be proper ways to facilitate and promote water conservation?</p>
	<p>d) Kindly share with me your e experiences pertaining to the conservation of water in your area.</p>
<p>3. To determine what community members in Lephalale area consider to be practices that hinder water conservation</p>	<p>e) What practices do you regard as hindering water conservation?</p>
	<p>f) What are some of the practices that distinguishes behaviour promote or hinders water conservation?</p>

APPENDIX 1b: Semi-structured interview guide – Sepedi version

Maikemišetšo	Potšišo
<p>4. Go nyakolla dipono tša maloko a setšhaba tikologong ya Lephallale mabapi le tsheketšo ya meetse.</p>	<p>g) Go ya ka wena, tsheketšo ya meets ke eng?</p> <p>h) Hle mpotše se o se naganago ka tsheketšo ya meetse.</p>
<p>5. Go nyakišiša seo maloko a setšhaba sa Lephallale ba se tšeago go ba mekgwa ye mebotse ya go nolofatša le go hlatloša tsheketšo ya meets.</p>	<p>i) Na o kwešiša eng e le mekgwa ye mebotse ya go nolofatša le go hlatloša tsheketšo ya meetse?</p>
	<p>j) Hle re nyetlele ka maitemogelo a gago mabapi le tsheketšo ya meets mo lifelong la geno.</p>
<p>6. TGo nyakolla seo maloko a setšhaba sa Lephallale ba se tšeago e le ditlwaedi tsa go palediša tsheketšo ya meets.</p>	<p>k) Na ke ditlwaedi dife tše di šitišago tsheketšo ya meetse?</p>
	<p>l) Na ke dife ditlwaedi tše dingwe tša go farologanya mekgwa ya go hlatloša goba go šitiša tsheketšo ya meets?</p>

APPENDIX 1c: Semi-structured interview guide – Setswana version

Maikaelo	Dipotso tsa ditherisano
<p>7. Go sekaseka dikakanyo tsa baagi ba Lephallale mabapi le tshomarelo ya metsi.</p>	<p>a) Go ya ka wena, tshomarelo ya metsi e kaya eng?</p> <p>b) A o ka mpoletela se o se tlhaloganyang ka tshomarelo ya metsi?</p>
<p>8. Go sekaseka se baagi ba Lephallale ba se akanyang ka ga go nna batho ba maleba mo go tswelatseng lenaneo la tshomarelo ya metsi.</p>	<p>c) O akanya ditsela tse di maleba tsa go godisa kakanyo ya tshomarelo ya metsi e le tse dife?</p> <p>d) A o ka ntlhalosetsa ka maitemogelo a gago mabapi le tshomarelo ya metsi mo tikologong ya gago?</p>
<p>9. Go lebelela ka moo baagi ba Lephallale ba akanyang gore ke maitsholo afe a a kgoreletsang tshomarelo ya metsi.</p>	<p>e) Ke ditiro tsefeng tse o gopolang gore di kgoreletsa tshomarelo ya metsi?</p> <p>f) Ke maitsholo afe a a supang go godisa kgotsa go kgoreletsa tshomarelo ya metsi?</p>

APPENDIX 2a: Participant consent letter and form – English version

Consent Letter

Department of Psychology
University of Limpopo
Private Bag X1106
Sovenga, 0727
Date: _____

Dear participant

Thank you for demonstrating interest in this study that focus on developing a psychological model to promote water conservation in Lephalale community in Limpopo province.

Your responses to this individual interview will remain strictly confidential. The researcher will not attempt to identify you with your responses to the interview questions or disclose your name as a participant in the study.

Please be advised that participating in this study is voluntary and that you have the right to withdraw your participation any time.

Kindly answer all the questions and reflect your true reaction. Your participation in this research is very important.

Thank you for your time

Sincerely

Seretlo-Rangata ML

Prof T Sodi (Supervisor)

Date

Date

Consent Form

I _____ hereby agree to participate in a PhD Research project that focuses on developing a psychological model to promote water conservation in Lephalale community in Limpopo.

The purpose of the study has been fully explained to me. I further understand that I am participating freely and without being forced in any way to do so. I also understand that I can withdraw my participation in this study at any point should I not want to continue and that this decision will not in any way affect me negatively.

I understand that this is a research project, whose purpose is not necessarily to benefit me personally. I understand that my details as they appear in this consent form will not be linked to the interview schedule, and that my answers will remain confidential.

Signature: _____

Date: _____

APPENDIX 2b: Participant consent letter and form – Sepedi version

Consent Letter

Department of Psychology
University of Limpopo
Private Bag X1106
Sovenga, 0727
Date: _____

Motšeakarolo yo a rategago

Re leboga ge o laeditše kgahlego mo nyakišišong ye ya go tsinkela tlhako ya mmotlolo wa Saekholotši go phagamiša tsheketšo ya meets setšhabeng sa Lephallale Phorobentshing ya Limpopo.

Dikarabo tša gago mo dipotšišong tša motho ka o tee e tla ba sephoro. Monyakišisi a ka se leke go go hlaola ka dikarabo tša gago mo diphotšišong goba go tšweletša leina la gago bjalo ka motšeakarolo mo nyakišišong ye.

Tseba gore botšeakarolo mo nyakišišong ye ke bja boukgethelo le gore o na le maloka a ikogela morago nako ye nngwe le ye nngwe.

Hle araba dipotšiso ka moka mme o tšweletša bonnete bja gago. Botšeakarolo bja gago mo nyakišišong ye bo bohlokwa kudu.

Re leboga nako ya gago.

Wa lena

Seretlo-Rangata ML

Prof T Sodi (Supervisor)

Letšatšikgweni

Letšatšikgweni

FOMO YA TUMELELANO

Nna _____ ke dumela go tšea karolo mo phorotjekeng ya nyakišišo ya PhD yeo e tsinkelago go tlhaka mmotlolo wa Saekholotši go hlatloša tsheketšo ya meets setšhabeng sa Lephallale Phorobentsheng ya Limpopo.

Maikemišetšo a nyakišišo ye ke a hlaloseditšwe ka botlalo. Gape ke kwešiša gore ke tšea karolo ka boithaopo ntle le kgapeletšo. Ke kwešiša gape gore nka ikogogela morago nako efe goba efe g eke ekwa ke sae sa nyaka go tšwela pele le gore sephetho se se ka se nkame gampe.

Ke a kwešiša gore se ke phorotšeke ya nyakišišo, yeo maikemišetšo a yona e se bego go nkholo ka bonna. Ke a jhlaloganya gore maina aka bjalo ka ge a tšwelela mo fomong ye a ka se tswalenywe le šetulo ya dipotšišo, le gore dikarabo tša ka e tla ba sephiri.

Mosaeno: _____

Letšatšikgwedi: _____

APPENDIX 2c: Participant consent letter and form – Setswana version

Consent Letter

Department of Psychology
University of Limpopo
Private Bag X1106
Sovenga, 0727
Letsatsi: _____

Motseakarolo yo rategang

Ke leboga fa o bontshitse kgatlhego tlhotllhomisong e ya patlisiso ye e tsepeletseng ya go bopa tlhaloso ya saekholotši go rotloetsa tshomarelo ya metsi setšhabeng sa Lephallale Profenseng ya Limpopo.

Dikarabo tsa gago dipotsong tse e tla nna sephiri. Mmatlisisi a ka se ke a go tswalantsha le dikarabo kgotsa a senola maina a gago jaaka motseakarolo fa thutong e.

Ka kopo lemogela gore go tseakarolo jwa gago fo thutong e ke ka boithaopo le gore o na le ditkolelo tsa go ikgogela morago leng kgotsa leng.

Ka boammaruri araba dipotso tsotlhe o ntshe se mafatlheng a gago. Go tseakarolo jwa gago fa patlisisong e go botlhokwa thata.

Ke leboga nako ya gago

Seretlo-Rangata ML

Morutwana

Prof T Sodi

Mokaedi

Letsatsi

Letsatsi

FOMO YA TUMELELANO

Nna, _____ ke dumela go tsea karolo mo phorotšekeng ya patlisiso ya PhD ye e tsepeletseng ya go bopa tthaloso ya saekholotši go rotloetsa tshomarelo ya metsi setšhabeng sa Lephhalale Profenseng ya Limpopo.

Ke tthaloseditswe maikemisetso a thuto ye ka botlalo. Gape ke utlwisisa gore ke tseakarolo ke lokologile kante le go gapeletswa. Gape ke utlwisisa gore nka lesa go tsea karolo thutong e nako e nngwe le e nngwe fa ke sa tihole ke batla go tsea karolo le gore tshweetso eo eka se nkame gampe.

Ke utlwisisa gore se ke phorotšeke ya patlisiso, yeo maikemisetso a yona e seng go tswela nna mosola. Ke utlwisisa gore dikgang ka nna jaaka di bonagala fa fomong ya tumelelano di ka se kgolagangwe le lenaneo la dipotsolotso, le gore dikarabo tsame e tla nna sephiri.

Mosaeno: _____

Letsatsi: _____

APPENDIX 3: ETHICAL CLEARANCE CERTIFICATE



University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3935, Fax: (015) 268 2306, Email: anastasia.ngobe@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE
ETHICS CLEARANCE CERTIFICATE

MEETING: 12 August 2020

PROJECT NUMBER: TREC/151/2020: PG

PROJECT:

Title: Perceptions of community members in Lephalale area towards water conservation: Towards the development of a psychological model
Researcher: ML Seretlo-Rangata
Supervisor: Prof T Sodi
Co-Supervisor/s: Prof S Govender
School: Social Sciences
Degree: PhD in Psychology

PROF P MASOKO

CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: REC-0310111-031

Note:

- i) This Ethics Clearance Certificate will be valid for one (1) year, as from the abovementioned date. Application for annual renewal (or annual review) need to be received by TREC one month before lapse of this period.
- ii) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee, together with the Application for Amendment form.
- iii) PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

APPENDIX 4: LANGUAGE EDITOR CONFIRMATION LETTER

Cell: 0822198060
Joerams1958@gmail.com

Dr. J R Rammala
440B Mankweng
Box 4019
Sovenga
0727
20 June 2023

EDITORIAL CERTIFICATE

Author: **SERETLO-RANGATA ML**

TITLE: Perceptions of community members in Lephalale area, Limpopo province, towards water conservation: Towards the development of a psychological model

This document certifies that the above PhD thesis was edited by Dr. J R Rammala (Ph.D., Linguistics). The document was edited and proofread for proper English language, grammar, punctuation, spelling, and overall style. The editor endeavoured to ensure that the author's intended meaning was not altered during the review. Track changes have been used in editing to allow the client to view the changes suggested.

Kind regards



Dr J R Rammala