Barriers and Enablers of Water Conservation in Formal Residential Households in Cape Town, South Africa

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Declaration of Authorship

I have read and understood the regulations governing the submission of an MPhil dissertation, as contained in the rules of this University. I know the meaning of plagiarism and hereby declare that all of the work presented in this minor dissertation, save for that which is properly acknowledged, is my own.

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Abstract

In recent years, climate change has caused great changes in weather patterns such as extreme changes in rainfall leading to prolonged drought. Rapid urbanization has led to more than half of the world's population living in urban centres, and the growing urban population must share increasing scarcity of water, exacerbated by climate change. Thus, climate change and urbanization has contributed to the emergence of more water-stressed cities.

This thesis is concerned with water conservation as a method of adaptation to an urban water crisis. It looks into the water crisis in the City of Cape Town that took place during 2015-2017. The severe water crisis has been attributed to prolonged drought, rapid population growth, reliance on six-rain-fed dams to provide 95% of the city's water supply, and excessively high water use by formal residential households. The City of Cape Town took various measures to manage both the demand and the supply of water in order to alleviate the stress caused by the water scarcity. From January 2016, a public education campaign was paired with progressively increased water restrictions. However, despite the growing water restrictions and the worsening of the water crisis, Capetonians did not reduce water consumption enough.

Against this background, this thesis aims at gaining a nuanced understanding of the barriers and enablers to water conservation amongst residents in formal residential households in the City of Cape Town. The study focuses on formal residential households because the residents use 65% of the total municipal water supply. Data collection was carried out primarily in the Southern and Northern suburbs and consisted of in-depth interviews with 44 respondents using a semi-structured interview guide about daily water conservation as well as perceptions of the water crisis and of their role in mitigating the water crisis.

The data analysis involved development of a coding system and identification of three categories of water savers amongst the highest, the lowest, and the median levels of water conversation within the data set, referred to as respective the 'avid', the 'low' and the 'moderate' water savers.

The key findings are that the main barrier of water conservation for the 'low water savers' is lack of willingness to inconvenience one-self in relation to water conservation. Other important barriers to water conservation for the 'low water savers' included lack of information regarding the on-going water crisis, perceptions of the water crisis as non-urgent, limited trust in water governance institutions, and interest in maximising own benefit from the common water resource.

The dominant enabler amongst the 'avid water savers' is the pro-environment identity they possess, combined with a high self-efficacy to make a difference to the water crisis through their actions. The study

showed that this dominant enabling factor works as a catalyst to enhance other enabling factors, especially seeking information and engaging in conversations about water conservation within their social networks. Barriers such as the discomfort of taking short showers, standing inside a bucket during a shower and collecting greywater for re-use are seen as necessary actions that align with their identity and altruistic outlook towards the environment. Interestingly, 'the moderate water savers' held similar pro-environment identity but were constrained, mostly by institutional barriers, to reduce their water use.

Thus, the overall argument is that there is not one barrier or one enabler to water conservation. Rather, the main argument is that an overriding enabling factor for increased water conservation in daily life is a pro-environment identity combined with a high sense of self-efficacy. Finally, this study has shown that the factor of *Personal Characteristics*, serves as the main enabler *and* as the main barrier to water conservation because Personal Characteristics have a ripple effect on how factors such as *Information, Social, Technical, Financial or Institutional* factors affect a respondent's water conservation.

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Table of Contents

List of Figures

List of Tables

Chapter 1: Introduction

"We may not have control over the weather, but we do have control over our use of potable water for non-essential purposes. Our actions can change the scenario,"

Patricia de Lille – Mayor of City of Cape Town in 2017 (A4W News, 2017)

1.1 Background

In recent years the world has witnessed great change in rainfall patterns, weather variability, sea level rise, and extreme weather events, which are all seen as effects of climate change (Kahn, 2017). No country seems to be spared from the effects of climate change and both rural and urban populations suffer from prolonged drought. During the past 10 years, rapid urbanisation has led to more than half of the world's population living in urban centres (World Urbanization Prospects, 2014), which makes it pertinent to understand the effects of climate change on urban settings. Some of the cities that are traditionally drought prone have adopted sustainable water management, which can help them steer through the current effects of climate change. Los Angeles, California, for example, is situated in a water scarce region and has managed to keep water consumption today at the same level as in 1970 although the population has grown from 2.8 to 4 million inhabitants (Likela, 2019). In other cities, such as Windhoek, Namibia, population growth has greatly increased water demand and prolonged drought has led to challenges in water supply; in July 2019, the water demand of Windhoek was three times higher than the national water supply (Likela, 2019).

This thesis is concerned with the water crisis in the City of Cape Town that took place during 2015-2017. The city experienced 'a record-breaking' drought and the city and its neighbouring areas were declared a disaster zone (Matikinca et al., 2020:23). The average rainfall for the 3-year period 2015-2017 was the lowest on record and 2017 was the lowest rainfall year since 1933 (Wolski, 2018)

The severe water crisis has been attributed to prolonged drought caused by climate change (Wolski, 2017), rapid population growth (Enqvist and Ziervogel, 2019:12), and reliance on six rain-fed dams to provide 95% of Cape Town's water supply, which includes agriculture and urban areas (Ziervogel, 2019:3) and excessively high water use by formal households (Enqvist and Ziervogel, 2019:5) According to the Department of Water and Sanitation, '70% of Cape Town's water demand by volume is from the domestic sector, with the balance being industrial, commercial and institutional. Of the domestic volume, approximately 5% is used by informal settlements, which comprise roughly 15% of all households. The formal households use approximately 65% of Cape Town's water demand (DWS, 2018:4).

Thomas (1998) points out that domestic water consumption is influenced by the ease with which the consumer has access to water and that a household supplied by piped water may consume 10 times as much as a household where water had to be collected from outside (Thomas, 1998 in Al-Amin et al., 2011). The high-water use by formal residential households contributed to a prolongation of the water crisis, which encouraged this inquiry into the water use of residents in formal residential households.

1.2 Barriers and Enablers to Water Conservation

The literature on water conservation shows that there are a number of factors that influence people's water use or, when situated into the broader context of climate change, adoption of pro-environmental behaviour. On the one hand, barriers that discourage pro-environmental behaviour include lack of information regarding an impending or on going water crisis; perceptions of the water crisis as non-urgent; limited trust in water governance institutions, interest in maximising own benefit of a common good; apathy or lack of willingness to inconvenience one-self in relation to a common goal; social norms and cultural values; limited access to technology that enhance water conservation, including financial ability; and institutional factors such as infrastructure and regulations (Kollmuss and Agyeman, 2002; Dziegielewski, 2003; Gardiner, 2009; Tenge et al., 2004; Blumstein, 1980). On the other hand, factors that enable water conservation involve pro-environmental attitudes and identity; altruism towards the use of a common good such as water resources; biospheric values, and high self-efficacy (Maki and Rothman, 2017; Schwartz, 1977 in Martin and Czellar, 2017, Bandura, 1968 in Kollmuss and Agyeman, 2002). There are thus many factors at play to enhance water conservation in a population and, as the City of Cape Town placed emphasis on precisely water conservation amongst its citizens, it would be relevant to look into what encouraged or discouraged water conservation amongst Capetonians during this recent water crisis.

1.3 Study Objectives and Research Questions

The overall aim of this study is to gain an understanding of the barriers and enablers to water conservation amongst residents in formal residential households in the City of Cape Town. It is relevant to investigate this population group because they consume 65% of the total municipal water supply and the formal residential households were in focus of the city council demand management (DWS 2018:4). The study explores the residents' perceptions of the water crisis, knowledge on water conversation, and daily water use as a pathway to explain why some individuals are more conscious about water conservation than others. The study can contribute to policymaking and education campaigns to enhance adoption of a water conscious way of living and, with time, groom a strong water saving culture within the city.

Objective 1

To understand how Cape Town residents perceive the water crisis and their role in it.

Research Questions

a. Are residents aware of the current water crisis?

b. How do residents perceive the water crisis?

c. What role do residents feel they play in the current water crisis?

Objective 2

To determine how Cape Town residents are responding to the water crisis in Cape Town

Research Questions

a. Are residents aware of how many litres of water they use daily?

b. What water conservation behaviours and techniques are currently being employed by residents in Cape Town?

Objective 3

To identify the Barriers and Enablers of water conservation for residents in formal residential households in Cape Town.

Research Questions

a. What do formal residents report as barriers to their conservation of water?

b. What do formal residents report as enablers to their conservation of water?

1.4 Thesis Outline

After this introductory chapter to the study follows a description of the context of the water crisis in Cape Town in late 2017 (Chapter 2). Chapter 3 presents the literature on urban water crises in urban centres and a presentation of the theoretical framework that underpins the analysis of this thesis. Chapter 4 describes the process of the study, introduces to the study site, and presents the methods used in data collection as well as in the data analysis. The chapter also presents the demographic characteristics of the respondents and introduces the three water saver categories that emerged from the data analysis and which are conducive to bring about a nuanced understanding of the barriers and enablers of water conservation amongst the respondents in this study. The three categories are referred to as respectively 'avid', 'moderate' and 'low' water savers.

Chapter 5 and Chapter 6 present the study findings. Chapter 5 presents the results from the respondents' reported water conservation practice and responds to Objective 2 that seeks to "*Determine how Cape Town residents are responding to the water crisis in Cape Town*". The water conservation practice is divided into reported water conservation behaviour and adoption of technical solutions, and the chapter

establishes the different ways of water conservation practice amongst the three water saver categories. Chapter 6 turns to the respondents' perceptions of the water crisis, knowledge on water conservation, and perceptions of their own water use in order to establish the disparity between the three water saver categories, which forms a basis for better understanding the quite varied water conservation practice presented in Chapter 5. The chapter also responds to Objective 1 that seeks to "*Determine how Cape Town residents perceive the water crisis and their role in it*".

After the presentation of the study findings, Chapter 7 presents an analysis of the barriers and enablers that led the respondents to take different actions in relation to water use. The three categories of water savers form the basis for an analysis of the barriers and enablers that led to such varied water use amongst the respondents in this study. The main argument is that an overriding enabling factor for the 'avid water savers' -i.e. the respondents who did most water conservation - was that they had a pro-environment identity hence water conservation is tied to their identity and self-perception.

As the final chapter, Chapter 8 sums up the conclusions and makes recommendations for future public education and awareness campaigns, policy and further research on this topic.

Chapter 2: The context of the water crisis in the City of Cape Town

2.1 Infrastructure of the Water Supply System

The water supply system relies heavily on rainfall and the climate of the City of Cape Town is therefore relevant to describe. The City of Cape Town has a Mediterranean style climate. The summer months (December-February) are hot, dry and windy with the highest average temperature of 26C. The winter months (June-August) are cold and wet, with an average maximum temperature of 17C and a minimum temperature of 9.1C (Tadross and Johnston, 2012:3).

On average, Cape Town receives approximately 500 mm of rain annually - June and July are typically the wettest months of the year with close to 100 mm of rainfall per month whereas December and January are the driest months and receive less than 20 mm per month. Rain does not fall evenly over the greater Cape Town area due to its topography, which ranges from the low lying sandy coastal plains of the Cape Flats to Table Mountain in the centre of the city, which stands 1000m above sea level (Tadross and Johnston, 2012:4). Rainfall is highest in the mountainous areas and often reaches 2000 mm per year while other parts of the city only receive 300 mm per year. (City of Cape Town Water Services, 2018:8).

Until 1921, Cape Town obtained freshwater from Table Mountain. As the city grew, this water source grew to be inadequate and an integrated supply system of dams and pipelines was built; known as the Western Cape Water Supply System. Today, Cape Town is supplied by 14 dams with a total capacity of approximately 900 billion litres, mostly from six large dams (the Theewaterskloof, Voëlvlei, Berg River, Wemmershoek, and the Steenbras Upper and Lower dams) whilst the remaining eight dams contribute only 0.4% to the total capacity (DWS 2018:2) This Western Cape Water Supply System is managed partly by the City of Cape Town and partly by the National Department of Water and Sanitation (Tadross and Johnston, 2012:3). The reliance on dams implies that, as Sub-Saharan African Cities report states: “Decreased rainfall accompanied with increased temperatures could lead to severe water shortages in a region which is already prone to frequent droughts. Since 1985, there have been nine winters with total rainfall below 70% of average (an average of more than one in every three years).” (Tadross and Johnston, 2012:3). Along the same line of thought, Olivier and Xu (2018) argue that diversification of the water sources would make the water supply system less vulnerable to drought. Besides diversification, which would have made the water supply more resilient to pro-longed low rainfall, the water shortages were exacerbated by other factors, especially lack of investment in water supply capacity to match the population growth and high consumption (Parks et.al. 2019:3, Ziervogel et al., 2010:99).

The population of Cape Town has grown from 1.6 million in 1980 to over 4 million in 2018 yet the capacity of the water supply system has not been expanded to cater for this rapid population growth (Parks et.al. 2019:3). In 1990, the Water Research Commission informed that the CoCT would face a major water supply crisis in 2007 and advised for expansion of water supply system and introducing new water conservation and management laws (Parks et.al. 2019:3). While the CoCT received limited resources from the national government to expand water supply capacity, it was successful in the implementation of extensive water demand management (Parks et.al. 2019:3). Key measurements were to repair leaks, public awareness campaigns, and introducing market-based pricing including reinforcement of block tariffs, which build on the principle that "medium users should cover the costs of themselves and the poorest, while high-end users would also pay for the cost of new water sources" (Smith 2004 in Enqvist and Ziervogel, 2019:5). However, the reduced water demand achieved in the 1990s was not sufficient to evade the water supply crisis caused by inadequate water supply capacity and prolonged rain-fall in 2015.

2.2 Climate Change Leading to Multi Year Drought

Over the past 30 years, there has been an increase in the average temperature in South Africa of 0.14 degree Celsius per decade (Parks et.al 2019), which can be seen as a local reflection of global warming. This increase in the average temperature has been attributed as the main cause of climate change leading to the multi-year drought from 2015 to 2017 (Otto et al., 2018:1). While the severity of the drought is a rare event, climate change has significantly increased, more than doubled, the likelihood of a prolonged drought to occur (Wolski., 2018:26).

Ann Van Loon from the School of Geography, Earth and Environmental Science at the University of Birmingham's has defined hydrological drought as "a lack of water in the hydrological system" which results in uncharacteristically low stream flow in rivers in addition to abnormal and unusually low water levels in lakes, reservoirs, and groundwater. Loon goes on to say that hydrological droughts are part of a "bigger drought phenomenon that denotes a recurrent natural hazard" (Loon, 2015 p.359) indicating that this type of drought that Cape Town has the potential to be a recurrent event.

The physical manifestation of the drought is obvious from a snapshot of the City of Cape Town's online Water Dashboard, which shows that the dam storage for the six major dams on 19th June 2017 was 23.1%. While being at a quarter of its full capacity may not seem like a critical status, it is so because the last 10% of a dam's water is difficult to use, hence the water available for use would actually be 13.1% (City of Cape Town Water Dashboard, 2017).

A comparison of the water level in the six major dams over a five-year period, which includes the time before the drought, will further illustrate the severity of the drought. Table 1 below uses data from the same date in 2017 and it shows that in June 2014, the dam level stood at 92.2% and dropped 40% to 51.3% in June 2015, made another 33.3% drop in June 2016 to just one third of its capacity, and reached the low of just 23% in June 2017 (City of Cape Town Water Dashboard, 2017).

Major dams	Storage Capacity MI	% 19-Jun-17	% Previous week	% 2016	% 2015	% 2014	% 2013
Berg river	130,010	34.2	32.2	36.6	58.0	100.9	91.9
Steenbras lower	33,517	28.8	28.0	33.5	52.7	65.6	72.8
Steenbras upper	31,767	58.8	53.8	60.8	56.1	102.3	86.1
Theewaterskloof	480,188	17.3	15.3	32.1	53.2	96.5	79.3
Voëlvlei	164,095	18.0	16.6	24.0	39.0	77.6	67.5
Wemmershoek	58,644	36.6	36.6	47.1	51.5	87.7	85.1
Total stored	898,221	207,063	190,548	299,472	460,569	827,932	712,604
% Storage		23.1	21.2	33.3	51.3	92.2	79.3

Table 1: Downward trend of dam storage levels of the six major dams from 2014 to 2017 (City of Cape Town Water Dashboard, 2017)

This stark drop in dam storage has been cited as a main reason for the water crisis in the City of Cape Town in 2017. Based on analysis of the rainfall data over the past 80 years in order to assess the severity of the current hydrological drought in the City of Cape Town, the renowned hydro-climatologist Piotr Wolski points out that the rainfall in 2015-2017 have been the lowest since 1981 and that the rainfall in 2017 was the lowest rainfall year since 1933 (Wolski, 2018:25).

2.3 Governance of the Water Crisis

The City of Cape Town took various measures to manage both the demand and the supply of water. As mentioned earlier, water conservation and demand management have been central to the City's water management since the 1990s (Parks et.al., 2019:3; Enqvist and Ziervogel, 2019:5). Cape Town was awarded the C40 Cities Awards in 2015, for committing itself in 2007 to what it described as "a comprehensive programme of water conservation and water demand management (WCWDM) aimed at minimizing water waste and promoting efficient use of water" (C40 Cities Awards, 2016). The commitment to low water use was also highlighted in the city's key document for urban planning in 2016:

> "The water use per capita in Cape Town dropped to 202,18 litres per day in 2013 and decreased even further to 198,85 litres per day in 2014, representing lowest daily water use

figures per capita for the past 19 years" (City of Cape Town Integrated Development Plan, 2016).

In May 2017, the city council appointed a Water Resilience Task Team in May 2017 as part of its efforts to augment the water supply. The Task Team formulated the Water Resilience Plan that focused on supplementing the existing surface water by creating emergency water sources such as groundwater extraction in the Table Mountain Group, Atlantis and Cape Flats aquifers, water re-use and installation of desalination plants (Ziervogel, 2019 p.6). The City of Cape Town also began to discuss the importance of Water Sensitive Urban Design principles such as storm water harvesting and permeable pavements (Armitage et al., 2014). The city council also used various demand management strategies such as public education, water management programs such as leak detection and repair, regulations, and economic incentives (City of Cape Town, 2017 p.23). Since formal residential households use 65% of the water consumption, the city placed great emphasis on raising awareness about the water crisis and how to conserve water through its 'Think Water' campaign. Information about the dam level and the water restrictions at the time were communicated through mainstream media such as radio, television, newspapers, and electronic billboards on the highways. Information about how to minimise the use of clean water for gardening and other outdoor purposes was distributed in pamphlets and online (City of Cape Town Alternative Water Resources, 2018 p.2).

The city council also used digital means of communication in its 'Think Water' Education and Awareness Campaign. Figure 1 below are posters rolled out in October 2017.

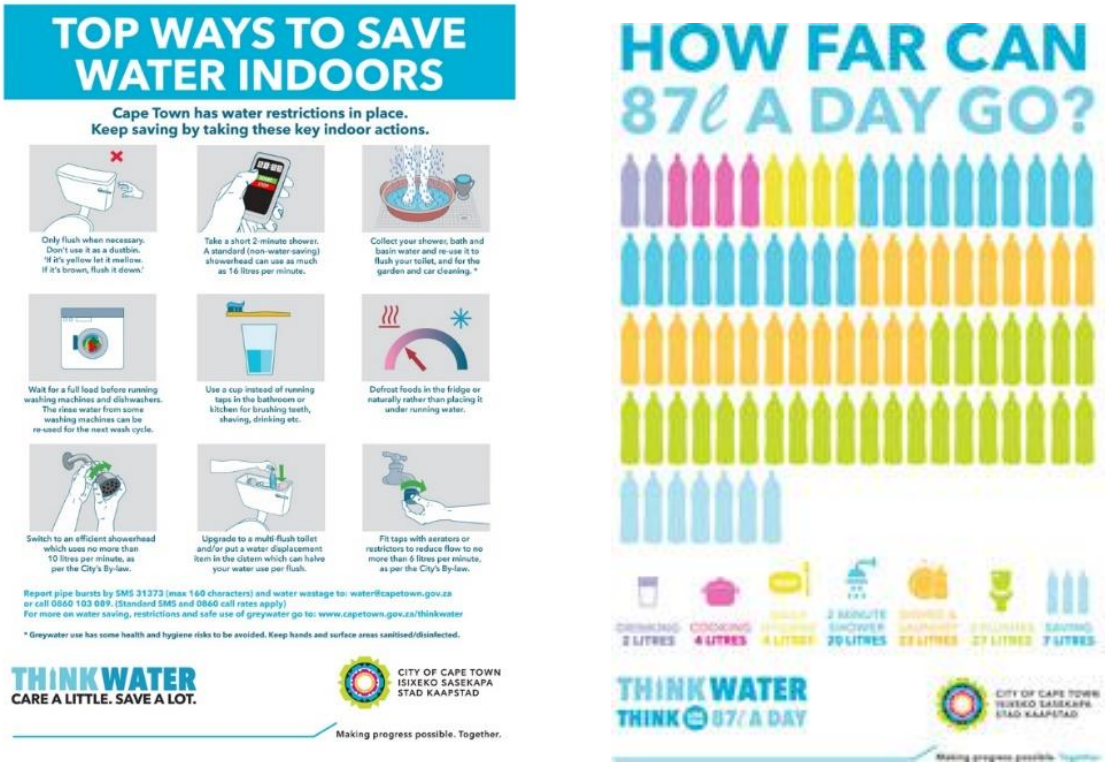

Figure 1: City of Cape Town 'Think Water' Education and Awareness Campaign Posters

From January 2016, the public education awareness campaign was paired with progressively increased water restrictions. Figure 2 shows that the water restrictions focused on gardening, car wash, and topping up private and public pools (City of Cape Town, 2017 p.17).

Level	Date	Restriction	Target
Level 1	2005	• No irrigation 10:00-16:00 • Spray nozzles for hosepipes • No hosing down hard surfaces • No dampening of building sand	10% savings
Level 2	2016 Jan 01	• Irrigation for 1 hour on Tue, Wed, Thur • No irrigation 9:00-16:00	20% savings
Level 3	2016 Nov 01	• Buckets only • Pool covers	30% savings
Level 3B	2017 Feb 01	• No private car washing	30% savings
Level 4	2017 June 01	• No irrigation • No topping up of private pools	100 litres/person/day
Level 4B	2017 July 01	• No topping up of public pools	87 litres/person/day
Level 5	2017 Sept 03	**Fines:** • Residential > 20kl/m • Commercial: 20% less than same month previous year	87 litres/person/day

Figure 2: Water Restrictions from January 2016 to July 2017,City of Cape Town. (2017)

In September 2017, the city council introduced Level 5 Water Restrictions with fines as a deterrent from higher water consumption than the daily limit of 87 litres per person per day. Figure 3 below shows that this water restriction included punitive measures in residential units and commercial properties, and prohibition from use of portable play pools and municipal drinking water in water features (City of Cape Town, 2017 p.18)

LEVEL 5 WATER RESTRICTIONS	
CONSUMPTION PER PERSON	87 litres or less per person per day **wherever you are**: home, work, school, etc.
LIMIT FOR INDIVIDUAL RESIDENTIAL UNITS	Residential units exceeding 20 kilolitres per month **will be fined**
COMMERCIAL PROPERTIES	Reduce consumption by 20% compared to previous year. Properties exceeding this **will be fined.**
IRRIGATION WITH MUNICIPAL DRINKING WATER	Prohibited
IRRIGATION WITH BOREHOLE / WELLPOINT WATER	Restricted
BATHROOM	Flushing toilets with non-drinking water (e.g. greywater / rainwater) encouraged
WATER FEATURES	Use of municipal drinking water prohibited
SWIMMING POOLS (public and private)	• Top-up, filling or refilling with drinking water prohibited • Use of portable play pools prohibited
WASHING VEHICLES (privately or at a formal/informal car wash)	Prohibited with municipal drinking water
FACILITIES	• Operation of spray parks prohibited • No new landscaping or sports fields may be established, except if irrigated only with non-drinking water
INDIGENT WATER ALLOCATION	Still applies

Figure 3: Level 5 Water Restrictions, City of Cape Town. (2017)

However, despite the growing water restrictions and the worsening of the water crisis, Capetonians did not reduce water consumption enough. In February 2017, the city released a statement quoting Mayor Patricia De Lille for saying that "*Capetonians have to date been unable to achieve the target of 700 million litres per day after it was set in the middle of February, consistently using roughly 100 million litres more*" (De Villiers, 2017a). The spokesperson for the mayor supplemented that "*We are stepping up our efforts to save water; we are naming and shaming residents that don't seem to care*" (De Villiers, 2017a). A mainstream newspaper published a list of the 100 highest water users amongst the formal residential households with the aim of drawing attention to the problem of high-water usage (De Villiers, 2017a).

The shift in focus of water governance from system repair and block tariffs in the 1990s to increased focus on water conservation amongst domestic water users, implied that during the water crisis the CoCT placed greater emphasis on water conservation amongst high tariff users than generating income for the municipality (Enqvist and Ziervogel., 2019).

Chapter 3: Literature Review

This chapter presents the theoretical framework for this thesis by introducing to the literature on behaviour change in relation to water use and attention to barriers and enablers of water conservation. This literature presents a line of thinking that emphasises the role of personal characteristics as a key driver of pro-environmental behaviour.

3.1 Adoption of Pro-environmental Behaviour

Pro-environmental behaviour can be defined as "individual behaviour contributing to environmental sustainability such as limiting energy consumption, water conservation, avoiding waste, recycling, and environmental activism" (Maki and Rothman, 2017). In this thesis, pro-environmental behaviour refers to water conservation.

There is a general consensus within the literature that behaviour change is driven by numerous factors and that these factors can influence either as 'enablers' or 'barriers' to behaviour change; leaving open that a factor may function both as an enabler and a barrier in a certain context (Miafodzyeva and Brandt, 2013; Mitchie et.al., 2011 ; Kollmuss and Agyeman 2002). Barriers can be viewed as "factors, conditions or obstacles that reduce the effectiveness of adaptation strategies" (Antwi-Agyei et al., 2015) whereas enablers can be viewed as factors, which contribute towards a desired behaviour such as lower water consumption. For example, limited knowledge on water conservation can be a barrier to reduce water consumption whereas adequate knowledge can enhance water conservation. That said, while adequate knowledge on water conservation may motivate change towards a desired behaviour, knowledge is far from the only factor that can explain how a person behaves. (Kollmuss and Agyeman, 2002).

In the article tellingly titled '*Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour?*' Kollmuss and Agyeman (2002) review the most commonly used analytical frameworks "to explain the gap between the possession of environmental knowledge and environmental awareness, and displaying pro-environmental behaviour' (Kollmuss and Agyeman, 2002 p.239). The review presents a number of ways to categorise the various factors that have positive or negative influence on pro-environmental behaviour and the difficulty to visualize the factors in a single framework or diagram (Kollmuss and Agyeman, 2002 p.239). Kollmuss and Agyeman (2002) suggests that a distinction between three types of factors is useful for understanding the factors that influence an individual's decision to act in a more or less pro-environmental manner. The first category is *Demographic Factors*, in which they point out that gender and years of education have high influence on pro-environmental behaviour, for example women are generally more emotionally engaged in environment

concerns and more willing to change to pro-environment behaviour than men (Kollmuss and Agyeman, 2002 p.248). The role of education appears to be less direct as more education does not necessarily mean change towards the desired behaviour (Kollmuss and Agyeman, 2002 p.248). The second category is *Internal Factors*, which involves motivation, environmental knowledge, values, attitudes, and environmental awareness. They point out that motivation, values, and attitudes can be more influential on pro-environment behaviour than environmental knowledge and awareness (Kollmuss and Agyeman, 2002 p.250). The third category, *External Factors*, includes institutional factors (such as tenants unable to make structural change), economic interests (such as reduce water consumption in order to save water cost), and social and cultural norms (Kollmuss and Agyeman, 2002 p.228). I find this overall categorization conducive for understanding the gap between knowledge and action in relation to water conservation. However,grouping institutional aspects, economic interests, and social and cultural norms into one category seems to be too broad for my analysis. A systematic literature review on the barriers to climate change adaptation in sub-Saharan Africa led to identification of the following six main factors: financial, socio-cultural, information, technological, institutional, and infrastructural barriers (Antwi-Agyei et al., 2015). The focus on adaptation to climate change speaks well to the topic of this thesis and I find these more tangible factors useful for structuring the analysis.

3.2 Factors Affecting Water Conservation

This section introduces the main factors for people to change towards desired behaviour in relation to an environmental crisis such as a water crisis. It begins with a focus on the role of personal characteristics, which is the dominant factor, both as an enabler and as a barrier. The section moves on to the five key factors: information, social, technological, financial, and institutional factors. Figure 4 below illustrates how these six factors fit together and influence environmental behaviour. In this conceptual diagram, personal characteristics is at the heart of the diagram as this thesis argues that personal characteristics are the key factor that has the most positive or negative influence on water conservation, with the other five factors all being influenced by an individual's personal characteristics. This argument will be explored in greater detail in the literature review and the results chapters that follow.

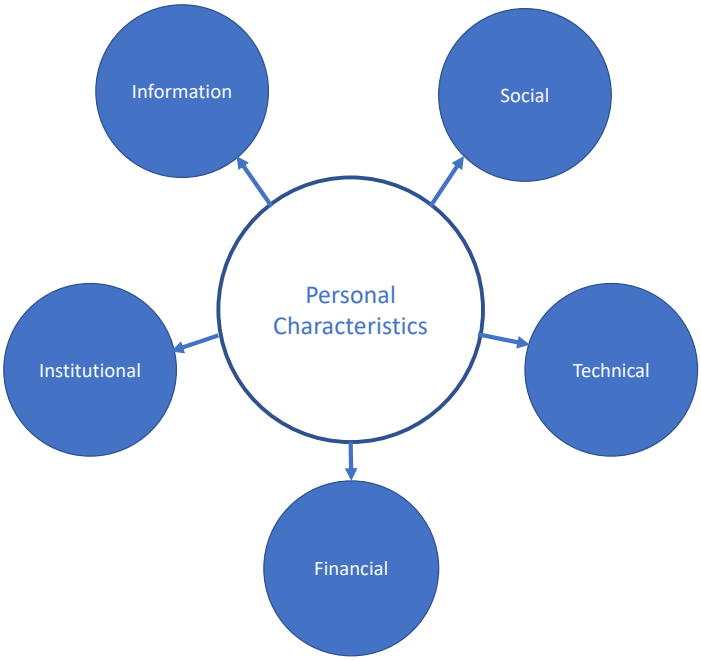

Figure 4: Conceptual diagram showing how the six factors fit together and influence environmental behaviour

3.2.1 Personal Characteristics

This section seeks to make clear the connection between the key personal aspects that shape a person's inclination to act in a pro-environmental manner. Gaspar (2013) refers to "dispositional or individual characteristics" under which he includes an individual's "general tendencies, motivations, values, world views, attitudes and other types of individual traits and mental representations of the self and the world around" (Gaspar, 2013 p.2968). It takes point of departure in the Norm Activation Model developed by Schwartz (1977), builds on the importance of high sense of self-efficacy (Kollmuss and Agyeman, 2002) and ends with focus on biospheric values and pro-environmental identity (Martin and Czellar, 2017). The section will also include attention to personal traits that lower pro-environmental behaviour.

The Norm Activation Model (Schwartz, 1977) considers pro-environmental behaviour as a form of altruistic behaviour as individuals give up personal benefits for the sake of furthering collective interests such as environmental protection (Abrahamse and Steg, 2009 p.712). An altruistic individual acting in accordance with his/her personal norms may lead the person to feel a sense of pride whereas behaviour that is not in line with their personal norms may result in the person feeling sense of remorse and guilt (Abrahamse and Steg, 2009 p.712). The theory of *Norm Activation Model* has inspired much research and literature on pro-environmental behaviour. One example is the study by Bissing-Olson et al., (2016) of 96 university students required to record their actions in taking part in pro-environmental behaviour. The

students' feelings of pride and guilt with regard to their behaviour were recorded for four times a day, for three successive days. Following the assumptions of the study, pro-environmental behaviour was associated with experiences of pride and guilt; interestingly, pride of pro-environmental behaviour was positively related to subsequent engagement in pro-environmental behaviour whereas guilt did not lead to pro-environmental behaviour change (Bissing-Olson et al., 2016 p.146). A related point is that for some individuals "social identities predict pro-environmental behaviour, but the strength may depend on whether the behaviour is visible to others" (Brick et.al, 2017). In other words, for an individual who identifies as an environmentalist, carrying reusable grocery bags, which can be observed by others, acts as motivation - "green to be seen" - and may enhance pro-environment behaviour and their position in the pro-environmental group. The Norm Activation Model has informed studies of environmental behaviour such as recycling and energy conservation (Abrahamse and Steg, 2009 p.712) and it is relevant here for understanding the ways in which altruism and positive emotions influence water conservation.

Icek Ajzen used the Norm Activation Model in his Theory of Planned behaviour (Azjen, 1985), which suggests that an individual's environmental behaviour can be explained by both their intentions, personal norms, and perceived behavioural control (Addo et al., 2018 p.8382; Abrahamse and Steg, 2009 p.711). The latter aspect, the perception of the degree of control to enact intended behaviour, was proposed by Albert Bandura (1986) in the Self-Efficacy Theory in which perceived self-efficacy and outcome expectancies are viewed as the two key determinants of behaviour (Kollmuss and Agyeman, 2002). According to Bandura, self-efficacy concerns a person's perception of their innate ability to bring about change through their behaviour (Kollmuss and Agyeman, 2002). Kollmuss and Agyeman (2002) link self-efficacy and the term "locus of control". A person with a strong internal locus of control will have a sense of high self-efficacy whereas a person with an external locus of control has a sense of low self-efficacy (Kollmuss and Agyeman, 2002 p.255). In relation to water conservation, people with an external locus of control living in a city undergoing a water crisis are more likely to feel unable to change the situation and blame other actors such as the government water authority (Jorgensen et. al., 2009; Van den Bos et al., 1998). Whilst the locus of control that a person feels in such a situation is affected by the person's trust in the government water authority, it is important that these institutions build trust between themselves and the public and thereby nurture internal locus of control, and in turn heighten sense of self-efficacy (Kollmuss and Agyemaan, 2002). Another form of negative externality is that people are less inclined to conserve water the more they perceive that other people waste water (Corral-Verdugo et al., 2002). This corresponds with the well-known notion of 'the tragedy of the commons' phrased by Garrett Hardin in 1968 where people act in their own short-term self-interest and depleting the resources, thereby

benefitting no one (Hardin 1968 in Corral-Verdugo, 2002). In the context of a water crisis, the tragedy of the commons is at stake when individuals are disinclined to lower their water use because they perceive that other people waste water (Corral-Verdugo, 2002). This is even at stake within the household, where inter-personal trust plays a role in household water consumption, as people are less inclined to save water if they feel others are not minimizing their water use (Jorgensen et al., 2009 p.227).

Following the discussion above on locus of control and self-efficacy are the responsibilities that a person chooses to bear. Kaiser and Shimoda (1999) have stated that "how responsible a person feels for the environment is a promising predictor of that person's ecological behaviour" (Kaiser and Shimoda, 1999). Once again, values and attitudes influence our feelings of responsibility, which in turn are influenced by our locus of control. A person's responsibilities must be ordered in terms of priority. Accordingly, Kollmuss and Agyeman (2002) maintain that "people with a greater sense of personal responsibility are more likely to engage in environmentally responsible behaviour" (p.243).

The sense of responsibility is related to pro-environment behaviour for people holding biospheric values as they "tend to view their own and others' actions in light of the advantages and drawbacks for nature" (Martin & Czellar, 2017 p.57). We use values to provide us standards against which the behaviour of individuals and societies can be judged (Leiserowitz et.al., 2006 p.414), hence people holding biospheric values are inclined towards purchasing green products, green intentions, and attitudes towards sustainable behaviour (Martin & Czellar, 2017 p.57). This value orientation is linked to an individual's sense of connection to the natural environment, and their belief in the sanctity of the environment, encourages the development of biospheric values. It follows that "biospheric values are the basis of environmental self-identities" (Martin & Czellar, 2017 p.57).

Along similar line of thought though using somewhat different wording than biospheric values, Cho et al., (2013) view environmental attitudes as "psychological tendency expressed by evaluating the natural environment with some degree of favour or disfavour" (Cho et al., 2013 p.1054). One example of the effect that water conservation attitudes have on water consumption was seen in the study carried out by Willis et al. (2011) in Gold Coast City, Australia. The study showed that residents with high positive environmental and water conservation attitudes consumed much less water than residents with moderately positive attitudes towards water conservation (Willis et al., 2011 p.1997).

Axelrod and Lehman (1993) refer to environmental attitudes as "more significant predictor" of pro-environment behaviour than having environmental knowledge (Axelrod and Lehman, 1993:150). This difference between knowledge and attitude informing pro-environment behaviour is apparent when

taking a gender lens. Men generally have more extensive environmental knowledge than women, women are more emotionally engaged and show more concern about environmental destruction; while men tend to focus on technological solutions, women are generally more willing to change behaviour (Kollmuss and Agyeman, 2002). With reference to education, Addo et al. (2018) highlight that people with "greater educational attainment has greater concern for the environment and are able to carry out informed and sustainable environmental practices" (Addo et al., 2018 p.8382). In terms of age, Clark and Finley (2007) illustrated that older individuals are more likely to conserve water, and Lyman (1992) argues that retirees make a great effort to conserve water (Lyman, 1992).

The literature presented has linked altruism, self-efficacy, biospheric values, environmental attitudes, and self-identity to pro-environment behaviour, which will inform the analysis of the data set. The attention to negative externalities touched upon personal traits of people with little environment interest, namely low trust in the government water authority and in water conservation by neighbours and household members. It is important another two important aspects that inhibit pro-environment behaviour. First, people must perceive that there is an imminent risk of a water shortage in order to reduce water use (Dziegielewski, 2003). This was the case in Windhoek, Namibia, where water consumption remained somewhat constant during the drought in 2015 and citizens did not perceive that there was a need to save water (Remmert, 2017). Trope and Liberman (2010) propose that events which are perceived to be closer in time, space, or social distance have greater influence on the individual's action in relation to the event. As Spear (2018) phrases it, "people will not save water unless they perceive the need to do so" (Spear, 2018). Thus, people must perceive that there is a need to save water in order to change towards water conservation. Second, people who choose other responsibilities than environmental conservation have other priorities and often choose to not inconvenience themselves but adapt pro-environmental behaviour that requires minimum effort, cost or sacrifice to themselves (Dziegielewski, 2003). Different from people committed to water conservation, people with little interest in reducing water use would often have lower sense of connectedness to nature and a self-identity related to something else than environmental conservation.

3.2.2 Information Factors

Scholars generally agree that public education through mass media campaigns on an environmental concern is the basis for individuals to make a conscious decision to reduce their water consumption (Dziegielewski 2003; Van Poeck and Vandenabeele, 2012; March et. al., 2015; Seyranian et al., 2015; Addo et al., 2018). Katz et al., (2016) concur that communication is critical in water-conservation intervention strategies that aims at persuading households to conserve water resources (Katz et al., 2016). As

mentioned above, people must perceive that there is a need for water conservation in order to do so (Spear, 2017). Furthermore, research has shown that information about the cause of the environmental crisis encourages pro-environmental behaviour (Bord et al., 2000).

At times, communication - or rather lack of communication - by the authorities to the citizens can be viewed as the premise – or failure – to change attitudes towards a desired behaviour. A case in point is the report by Dietrich Remmert (2017), a scholar on water governance in Namibia, on the barriers to water conservation during the 2015 drought in Namibia, in which he argues that lack of communication and awareness raising was a key barrier to water conservation. According to Remmert (2017), the authorities in the water sector failed to put in place comprehensive communication strategies to make city residents aware of the urgent need to conserve water prior to and during the crisis (Remmert, 2017 p.8). The report concludes that lack of a "coherent, large-scale, well-resourced and professional water saving campaign" hindered the authorities to encourage the citizens in Windhoek engage in water conservation (Remmert, 2017 p.8). In other words, lack of information regarding an impending or ongoing water crisis is a barrier towards behaviour change towards water conservation.

That said, there are different views on the influence of knowledge on behaviour change. Kollmuss and Agyeman (2002) argue that it is simplistic to assume a linear relationship between environmental knowledge and pro-environmental behaviour and refer to Fietkau and Kessel (1981) in order to state that knowledge does not directly influence behaviour but rather 'acts as a modifier of attitudes and values' (Fietkau and Kessel (1981) in Kollmuss and Agyeman (2002 p.246). One concern is the issue of trust; that citizens must trust the water provider's assessment regarding the need to conserve water in order to comply with the water restrictions (Lee and Warren, 1981; Van den Bos et al., 1998 Jorgensen et.al., 2009). Another concern is that authorities must target water conservation campaigns to specific population groups - make it relevant to their current behaviour and the structural factors that may influence their behaviour (March et. al., 2015). Thus, as an individual's behaviour is a complex interplay of environmental knowledge, values, attitudes, emotional involvement, internal and external factors, which together form a '*pro-environmental consciousness*' (Kollmuss and Agyeman, 2002). Following this line of thinking, which questions the Knowledge-Attitudes-Practice model (KAP model), which assumes automatic translation of new Knowledge into change of Attitude and Practice, information about an impending or ongoing water crisis can encourage water conservation, but it would be wrong to assume that awareness raising in itself can encourage the desired behaviour change (Kollmuss and Agyeman, 2002 p.241).

3.2.3 Social Factors

Cultural beliefs and traditions in relation to water use and the cultural values ascribed to water affect how individuals interact, consume and conserve water (Jorgensen et al., 2009). Cultural values of water as well as social norms, traditions, and family customs shape people's attitudes towards water conversation (Jorgensen et al., 2009, Kollmuss and Agyeman, 2002). For example, if the dominant culture of a group promotes a general wasteful and unsustainable lifestyle, people would be less likely to adapt pro-environmental behaviour (Kollmuss and Agyeman, 2002 p.242). Cultural values also feed into notions of lifestyles in the sense of "that is the way we have always done it" (Blumstein et al., 1980 p.4) and conservation measures may be part of that lifestyle or conflict with cultural values for example high water consumption is associated with suburban living (Nicolson, 2017). In the case of the water crisis in the City of Cape Town, the public campaign advocated for water conservation measures that conflicted with some people's sense of hygiene e.g. not flushing every time but 'if its yellow let it mellow, if its brown flush it down'.

Social networks may influence individuals in the way they approach water conservation (Tenge et al., 2004; Videra et al., 2012). For example competition between close friends on who can use the least water and belonging to social media groups that exchange water conservation tips – or, for people not engaging in water conservation – that water conservation is not part of the conversation between friends. Whilst new social networks may change a person's priorities over time, some migrants may carry attitudes and behaviour that aligns with their previous lifestyles that could have been in areas that were not prone to water crisis and they may not have a full grasp of the situation or a sense of responsibility to contribute to solving a crisis (Trumbo and O'Keefe, 2005).

3.2.4 Technological Factors

Technological devises such as water efficient toilets and washing machines, and low-pressure showerheads can enhance water conservation. Professor in environmental engineering, Bidhendi (2018) led a study in Tehran, Iran, where an apartment complex was the site of a pilot project for water consumption management by using installation of technical devices such as single-handle faucets and reducers, low-flow faucets, showerheads, and flow aerators. The consumption patterns through meter readings were compared with the previous water use and showed a total reduction of 19% in water consumption (Bidhendi et al., 2018 p.45). The research team concluded that large-scale adaptation of these technical devices would greatly enhance the resilience of the city of Tehran in the face of water shortages (Bidhendi et al., 2018 p.47), and it recommended that low-price devices such as aerators and

low-flow showerheads should be *given* to water consumers (Bidhendi et al., 2018 p.47). This would imply that the city authority makes a financial investment in water conservation (Addo et al., 2018 p.8381).

Besides financial cost, most water efficient technology requires a certain level of technical know-how and ability to install and maintain the devices (Gardiner, 2009; Antwi-Agyei, et al., 2015). This is the case of efficient domestic rainwater harvesting where installation involves setting up a collection surface on the roof, guttering, and storage, which requires a lot of personal technical know-how and financial investment (Thomas, 1998 p.95). The analysis will look into the aspects of technical expertise and financial cost for adoption of water saving devices amongst the respondents.

The CoCT promoted water management devices in informal settlements as a technology to reduce water consumption and money. The technology was designed to avail 350 liters per day per household and it would switch off water beyond this daily volume. Over time the CoCT use of this technology has been critiqued for enforcing more tough water restrictions on poorer households (Enqvist and Ziervogel, 2019; Mahlanza et al., 2016). Since formal residential households were not targeted by CoCT for this water management device, this study will not attend further to this particular intervention.

3.2.5 Financial Factors

As water efficient technology is often expensive to purchase, install and maintain (Gardiner, 2009), financial barriers often go hand in hand with technological barriers (Antwi-Agyei et al., 2015). Considering that financial ability as an enabler to water conservation, Brody et al., (2012) point out that economic capacity is important for an individual to adopt pro-environmental behaviour as "individuals who have adequate financial resources to meet the costs associated with the pro-environmental behaviour, without substantially compromising their ability to meet their own basic needs, may be more likely to undertake pro-environmental actions." (Brody et al., 2012 p.5). However, like the connection between knowledge and behaviour, financial ability to change towards water efficient technology does not automatically lead to such behaviour change.

3.2.6 Institutional Factors

Institutional factors involve infrastructure and regulations that affect water conservation. In relation to the former, citizens mostly adapt pro-environmental behaviour when the infrastructure is in place. For example, lack of waste disposal facilities discourage individuals from engaging in recycling of domestic waste (Schultz et.al., 1995; Gaspar et al., 2010 p.2) and poor public transport discourages people from using private cars (Kollmuss & Agyeman, 2002: Tanner, 1999). In this case, tenants are often restricted from installation of technical devices, even small installations like a low-pressure showerhead, hence the place of residence can greatly limit the technical solutions that a person may use in terms of water

conservation (Blumstein et al., 1980 p.3). A house owner, on the other hand, with adequate space in the bathroom to re-use dirty shower or laundry water may be easier persuaded to collect such water and reuse it for watering the garden, for example.

Regulations may discourage water conservation, for example tenants in rental dwellings who make standard payment for water use have no economic benefit from water conservation and tenants may often not even know their water usage, which may be a lot higher than they assume. If people get information on their water consumption this will encourage water conservation (Sønderlund et.al., 2014).

Linking knowledge of water use with self-efficacy, people with knowledge on their own water use and who are convinced about the importance of their efforts are more likely to conserve water (Dziegielewski, 2003 p.33).

3.3 Conclusion

The theoretical framework of this thesis draws on the Norm Activation Model, which views pro-environmental behaviour as part of altruistic behaviour and underscores that positive emotions foster further conservation efforts, and has been linked to the notion of self-efficacy and the concept of biospheric values and pro-environmental identity. Following this line of thinking, the analysis will view personal characteristics as a driver of pro-environmental behaviour, especially the respondents' self-identity and sense of self-efficacy to contribute to solving the water crisis, in order to understand their water conservation practices. Whilst the literature on behaviour change generally agree that information – or knowledge – has high impact on attitudes and behaviour towards water conservation, this thesis will follow the premise that knowledge does not automatically lead to behaviour change. Similarly, easy access to technological devices and economic capacity to adopt such technical solutions do not necessarily lead to more pro-environmental behaviour. Social factors such as cultural values and social relations shape people's attitudes towards water as a finite resource and water conservation as part of daily life; which applies to both high and low water conservation. The final factor that this thesis will attend to is the institutional factor, mostly the influence of infrastructure and regulations on the water conservation amongst the respondents. In brief, this thesis will look into six factors – personal characteristics, information, social, technological, financial, and institutional – as both enablers and barriers with an expectation that the various factors will affect respectively high-moderate-low water conservation in different ways.

Chapter 4: Methods & Study Site

4.1 Journey to Study Topic

I moved to Cape Town from Kenya in late January 2017 to pursue my MPhil in Climate Change and Sustainable Development at the University of Cape Town. A neighbour informed me that Cape Town was going through a water crisis, and residents were advised to reduce their water consumption. Once coursework began, a recurring subject during class discussions was the water scarcity that Cape Town and the Western Cape were facing. During the day, I would speak with likeminded colleagues and friends about the water conservation measures they were implementing. As part of a class assignment to write a blog in April 2017, I chose to write about a seminar I had attended facilitated by the Future Water Institute at UCT, where they spoke about their '99 litres a Day' campaign and the Water Sensitive Urban Design.

Figure 5: Future Water '99 litre per day' Campaign Poster. Photo by Zain Kassam

Once I got home in the evenings, I observed a vastly different approach to addressing the water crisis. I shared an apartment with two female students who would let the tap run while dishes were being scrubbed, did several batches of laundry done per week and showers took quite long. I shared the information about water conservation I had come to learn and also tried to lead by example. Some water conservation measures were implemented by my flat mates, others were not.

While I was making these observations, I was on the quest to find a research topic for my thesis. During one phone call, my supervisor and I spoke about Cape Town's water crisis and how some people seemed to engage in several forms of water conservation, while others did not do so. The key concern was why people have such different water use. *Why* didn't my flat mate turn the shower off while she shampooed her hair, or *why* didn't a fellow neighbour have a low-flow showerhead? These questions on why some people conserved water, while others did not, turned into the research topic of this thesis.

4.2 Approval and Consent

I received the research ethics clearance from the Faculty of Science Research and Ethics Committee in October 2017. During data collection, I provided each respondent with a Consent Form (Annex A), which they read and voluntarily signed before I began the interview. In addition, I assured respondents of confidentiality of their identity and responses both during and after the research study. Following the FSREC approval I intend to abide by this request for transmission of the study results to a wider audience.

4.3 Study Focus: Formal Residential Households in Cape Town

The study site is 'formal residential households' in Cape Town because this population group uses approximately 65% of Cape Town's municipal water supply (Nicolson, 2017). The term 'formal residential household' is commonly referred to as a 'formal dwelling' in South Africa and it entails a permanent structure approved by a local authority and intended for permanent dwelling. In contrast, an informal dwelling is 'a makeshift structure not approved by a local authority and not intended as a permanent dwelling' (The Housing Development Agency, 2013 p.6). This study focused mainly on the Northern and Southern suburbs of Cape Town where such formal dwelling is common (see Figure 6 and Figure 7 below).

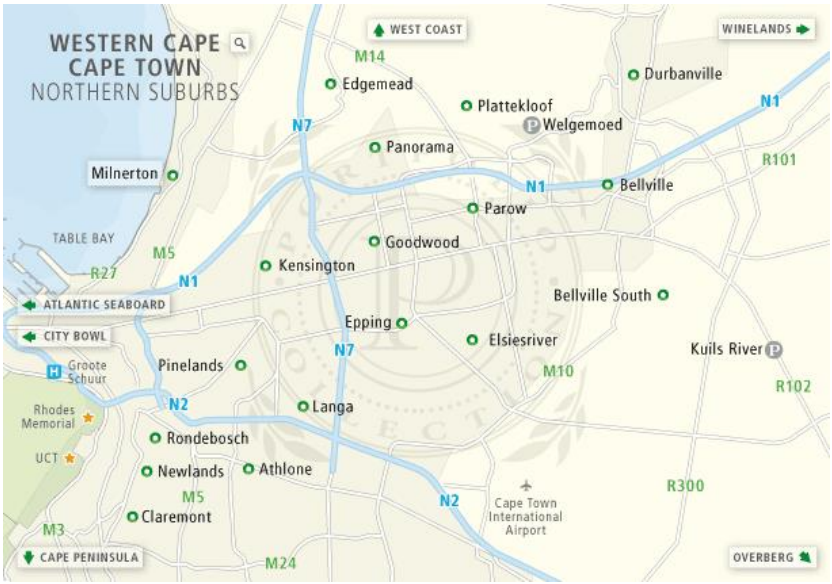

Figure 6: Map of Northern Suburbs, Cape Town, South Africa. Cape Town Northern Suburbs Map (2015)

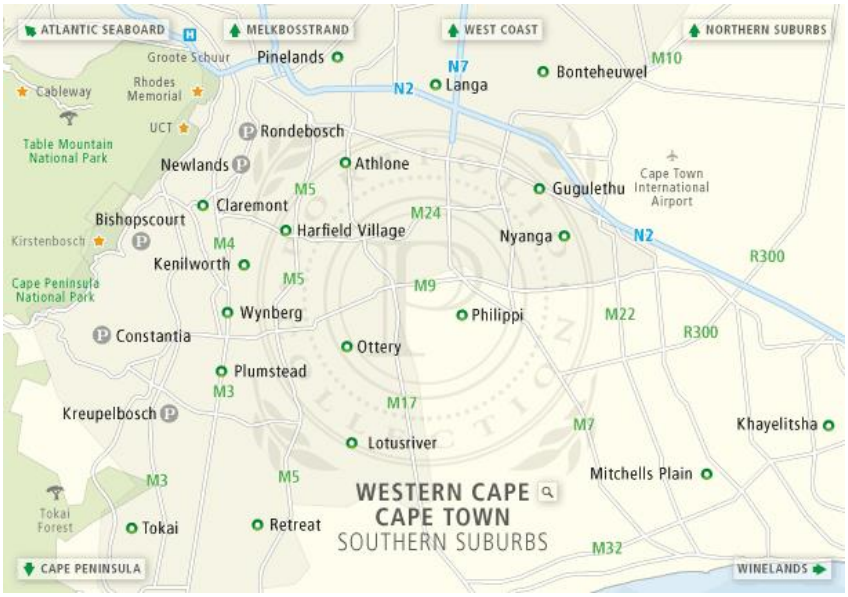

Figure 7: Map of Southern Suburbs, Cape Town, South Africa. Cape Town Southern Suburbs Map (2015)

4.4 Data Collection

4.4.1 Pre-Data Collection

This study used qualitative data collection methods to generate data that could form the basis of an understanding of people's water use attitudes and behaviour during a severe water crisis. Based on the research questions 'the people' were members of formal residential households in Cape Town.

The **semi-structured interview question guide** was developed with guidance from relevant studies. I found two articles particularly useful: Corral-Verdugo et al., (2002) presented the results from a study on motives for water conversation in residential households in Sonora, Mexico, and Mitchie et al., (2011) presented a literature review and ways of thinking within behaviour change theories.

I also found the City of Cape Town's 'Think Water Calculator' - an online calculator for residents to estimate their daily water consumption in 11 water use focus areas - useful for identification of focus areas of daily water use. I decided to include all the 11 focus areas the interview guide; the focus areas were: Shower, Toilet, Laundry, Dishes, Tooth Brushing, Daily Hygiene, Cooking, Drinking, Pets, Garden and Swimming Pool. Figure 8 and Figure 9 below, are snapshots of the online 'Think Water Calculator'.

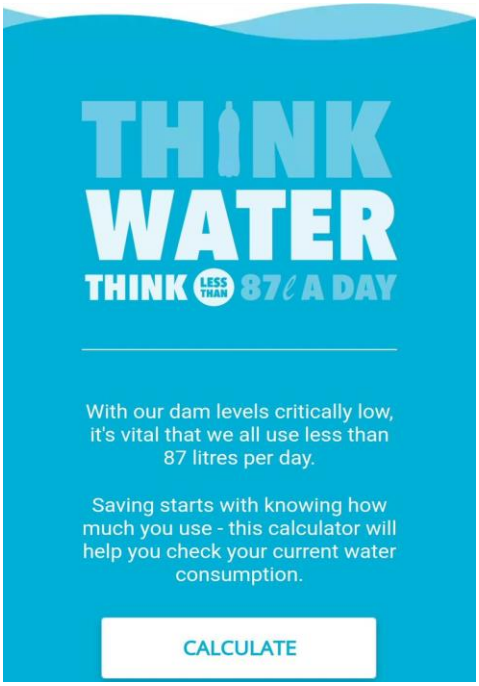

Figure 8: Snapshot (A) of City of Cape Town online 'Think Water Calculator'. City of Cape Town Think Water Calculator, 2017

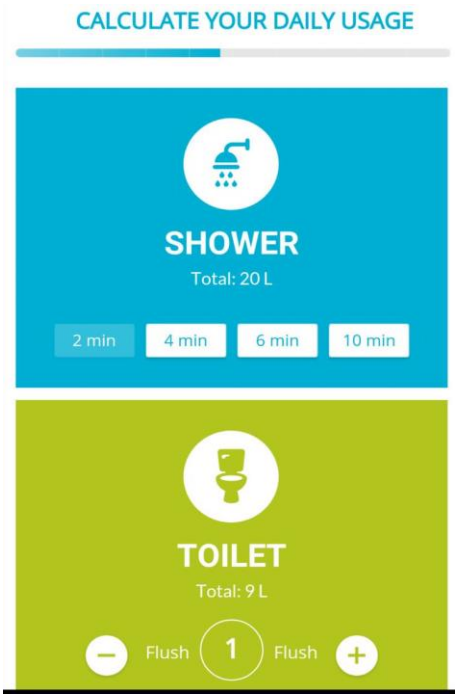

Figure 9: Snapshot (B) of City of Cape Town online 'Think Water Calculator'. City of Cape Town Think Water Calculator, 2017

The interview guide had 45 questions that could generate data to respond to the three study objectives (see Section 1.3) hence it began with a focus on perceptions of the water crisis and their role in alleviating the crisis, then moved on to daily practice and encouraged discussion of barriers and enablers of water conservation for the individual respondent (see Annex B). Most of the questions were open ended in order to allow the respondents answer questions in a relaxed manner, for example 'Tell me about your shower routine'. The respondents could answer and I would probe into aspects in order to cover the questions.

4.4.2 Identification and Recruitment of Participants

I used six ways to identify the respondents: social media, public space, a private course, one community meeting, my social network, and referral. First of all, I spoke with SMILE 90.4FM, a popular radio channel that was active in speaking about water conservation. The radio station promoted "Waterless Wednesdays" and it founded a group on social media platform Facebook called the "Smile Water Warriors". As presented on their Facebook Group, the "*Smile Water Warriors is a Public Group that serves as a platform where people who are serious about water saving and committed to combatting the water crisis can come together in mutual support and engage openly on this subject*". Facebook users can request to become a member and are alerted to new posts on its page. The management of SMILE 90.4FM gave me permission in September 2017 to advertise for respondents on the "Smile Water Warriors" Facebook

Group; it is seen as Figure 10 below. I also put the advert on the Western Cape Water Shedding Facebook Group and on my personal Facebook page.

Figure 10: Advert for Respondents. Advert by Zain Kassam

The second way was to put up my advert on notice boards in shopping complexes in Rondebosch (the formal residential area where I lived) and Claremont (a neighbouring formal residential area that I often frequented). The third strategy was to use my own participation in an Art of Living course, which focused on yoga, meditation and holistic being, as a platform for recruitment. On the last day of a 3-day course, I was given an opportunity to introduce my study topic and request for respondents to the group of approximately 25 people. The fourth way was to use the platform of a community meeting on water conservation in a neighbouring location, Observatory. I also asked people within my social network such as my flat mate. The sixth and final strategy was to encourage respondents for a referral to a person whom they considered was not committed to or 'did little' water conservation. Since many of the respondents were quite engaged with water conservation, this referral strategy was intended to balance between high and low water savers.

The data collection began on 31st October and was completed by 17th December 2017. Once I had gained contact with a potential respondent, we agreed on a time and venue; most often at coffee shops and a few times in people's homes. The latter allowed for taking pictures of the respondents' water conservation items. I used a Dictaphone to record the interviews, which on average lasted about one hour.

I conducted a total of 44 interviews. Two respondents turned out to not fit the criteria, as they did not live in a formal residential household, and two respondents gave convoluted answers. Table 2 below, presents the demographic characteristics of the 40 respondents included in the data set that underpins the analysis in this thesis.

Feature	Categories	Number of Respondents
Gender	Female	24
	Male	16
Age Group	Above 35 years of age	11
	Below 35 years of age	29
Race	Black	13
	White	12
	Indian	12
	Coloured	3
Occupation	Student	19
	Employer/Employee	21
Type of Residence	Stand Alone House	20
	Apartment	20
Ownership Status	Homeowner	15
	Tenant	25
Suburb	Southern Suburbs	28
	Northern Suburbs	7
	Atlantic Seaboard	3
	South Peninsula	2

Table 2: Demographic characteristics of the respondents

Note: 40% of the respondents were women below 35 years of age.

Table 3 below, presents the number of respondents recruited from each channel.

Smile Water Warriors and Public Advertisements	Art of Living 3 day Course	Observatory - Water Crisis Meeting	Personal Network	Referrals
12	5	1	9	13

Table 3: Recruitment of respondents per channel

4.4.3 Limitations in the Data Collection

The overall limitation is that the respondents talked about their water consumption but it was not observed or documented, but relied on the person's own reporting. As the interview went on for about one hour it was possible to gain a sense of the consistency in what the person reported. That said, the

study is not concerned with the actual water consumption amongst the respondents, but the motivations and obstacles that affect water conservation.

4.5 Data Analysis

The first step of the data analysis was to transcribe the recorded interviews; the second step was to code the transcribed interviews in order to identify patterns in the data set.

The reading of the transcriptions led to three observations that shaped the data analysis. First, only a few respondents had responded to all the eleven focus areas as only a few had a pet, a garden, and/or a pool. Since I wanted to understand the water conservation between all the respondents in the data set, I decided to take out the data on these three focus areas of water use. Thus, the further data analysis looked into the eight areas of water use in daily life: shower, toilet flushing, dish washing, laundry, daily hygiene, tooth brushing, cooking, and drinking water.

Second, there are two main ways to reduce water use; through behaviour and adoption of technical solutions that facilitate water conservation. I refer to the two options as respectively 'water conservation behaviour' and 'adoption of technical solutions'. I refer to 'water conservation behaviour' as repeated and deliberate behaviour taken by the respondent in order to conserve water and to a 'technical solution' as any device or Do-It-Yourself (DIY) fix that facilitates water conservation.

The third observation was that the respondents engaged in particular water conservation behaviour or adoption of technical solutions under each focus area. In relation to the shower focus area, for example, the respondents mentioned five measures of water conservation behaviour - take showers instead of baths, reduce time duration of showers, reduce frequency of showers per day, use start-stop washing, and use basins to collect greywater for re-use – and one technical solution, namely a low flow shower head. The various water conservation actions that the respondents talked about formed the basis for the development of a coding system, which allocates points to each water conservation action under a focus area, and which can thereby capture the extensiveness of water conservation in each focus area. A person could do one or more of the water conservation behaviour and/or get a low flow shower head, which would give each respondent a certain number of points within the shower focus area. For example, if a person does one action such as choose showers instead of baths he/she would get 1 point whereas if the person does two or three actions, he/she would get 2 points. Table 4 below gives an overview of the point allocation for each focus area for water conservation behaviour and adoption of technical solutions.

Focus Area (Total Points per Focus Area)	Water Conservation Behaviour (Number of Points)	Technical Solutions (Number of Points)
Shower (4 points)	i. Choose showers instead of baths ii. Reduce shower frequency iii. Reduce shower duration iv. Start-Stop washing v. Collect greywater using basis for re-use 0 actions (0) 1 actions (1) 2 or 3 actions (2) 4 or 5 actions (3) **Max Points: 3**	Easy DIY Technical Solution: Low flow showerhead (1) **Max Points: 1**
Dishes (2 points)	<u>If using sinks</u> i. Start-Stop washing/plugged sinks + let water go down drain (1) OR ii. Start-Stop washing/plugged sinks + collect and re-use dirty water (2) <u>If using Dishwasher</u> i. Reduced frequency of loads (1) ii. And/Or iii. Use eco-friendly/quick wash settings (1) **Max Points: 2**	No Technical Solution
Toilet (5 Points)	i. Reduced flush frequency per day (1) And/Or ii. Use of grey-water to flush toilet (2) **Max Points: 3**	Easy DIY Technical Solution: i. Weight in cistern (1) OR Expensive Technical Solution: ii. Water efficient toilet (2) **Max Points: 2**
Daily Hygiene (2 Points)	i. Start-Stop washing/use a cup + let water go down drain (1) OR ii. Start-Stop washing/plugged sinks + collect and re-use dirty water (2) **Max Points: 2**	No Technical Solution
Tooth Brushing (2 Points)	i. Start-Stop washing/use a cup + let water go down drain (1) OR ii. Start-Stop washing/use a cup + collect and re-use dirty water (2) **Max Points: 2**	No Technical Solution
Laundry (4)	i. Reduced frequency of loads (1) And/Or ii. Use eco-friendly/quick wash settings (1) **Max Points: 2**	Easy DIY Technical Solution: i. Re-routing water from washing machine into plastic basins (1) Or Expensive Complex Technical Solution: ii. Water Efficient Washing Machine (2) **Max Points: 2**

Cooking (2 Points)	I. Reduced water during cooking (1) AND/OR II. Re-use of water during cooking or other household use (1) **Max Points: 2**	No Technical Solution
Drinking (2 Points)	i. Collect drinking water from natural springs (1) And/Or ii. Buy drinking water (1) **Max Points: 2**	No Technical Solution
Maximum points achievable per respondent	18	5

Table 4: Overview of the Data Coding System

The maximum points that one individual can get is thus 23; 18 points for water conservation behaviour and 5 points for adoption of technical solutions. As this coding system captures the data on the water conservation actions it can inform a nuanced numerical lens of each respondent's water conservation. Moving from the individual to the data set, and following the example of the shower focus area, an individual can get maximum 3 points for water conservation behaviour and 1 point for adoption of a low flow showerhead; as the data set has 40 respondents it gives the focus area up to 120 points in relation to 'behaviour' and 40 points for adoption of a technical solution. See Table 5 below for an overview of the maximum points in the coding system.

	Maximum Points for Water Conservation Behaviour	**Maximum Points for Technical Solutions Adopted**
Shower	120	40
Toilet	120	80
Laundry	80	80
Dishes	80	No Technical Solution
Daily Hygiene	80	No Technical Solution
Brushing Teeth	80	No Technical Solution
Cooking	80	No Technical Solution
Drinking	80	No Technical Solution
Total points for participants	720	200

Table 5: Maximum points for each focus area

The total points for the data set is relevant in order to understand the commonness of water conservation behaviour and adoption of technical solution in relation to the various focus areas.

4.5.1 Identification of Three Water Saver Categories

The point system showed a great range between the respondents' water conservation as the lowest scoring person got just one point and the highest scoring person got 17 points.

In order for the analysis to bring out the nuances and understand the barriers and enablers to people with very different water conservation behaviour, I have identified three categories of water savers, which involve respectively the highest, the lowest, and the median water savers within the data set.

‘**Avid water savers’** consists of the 9 respondents with the **most** comprehensive water conservation practice (12-17 points each; equivalent to 52-74% of water conservation). The ‘**Low water savers’** consists of the 9 respondents with the **lowest** water conservation practice (1-6 points each; 4-26% of water conservation), whereas the ‘**Moderate water savers’** consists of 9 respondents with the ‘**middle**’ water conservation practice (9-11 points each; 39-48% of water conservation). The three water saver categories are an analytical tool that has been used for an in-depth analysis in the results chapters.

Chapter 5: Water Conservation Practice

This chapter presents the results on water conservation amongst the respondents in relation to the reported water conservation behaviour and adoption of technical solutions. It responds to Objective 2 that seeks to *"Determine how Cape Town residents are responding to the water crisis in Cape Town".* The chapter has five sections; it begins with an attention to the *number* of respondents who reported water conservation behaviour in each focus area and to the limitation of such an analysis. Drawing on the data coding system, which can provide a more in-depth analysis, the second section pays attention to the *extent* of water conservation behaviour, the third section focuses on the *adoption* of technical solutions, and the fourth section moves on to a *comparison* between the respondents' water conservation behaviour and adoption of technical solutions. The fifth section will take the analysis one step further by using the three water saver categories - avid, moderate and low water savers – which were introduced in Chapter 2, in order to create a better understanding of the water use amongst respondents with different practices in relation to water conservation.

5.1 Overview of water conservation behaviour of study respondents

The data analysis begins with an overview of the respondents' engagement in water conservation in relation to the eight focus areas of shower, dishes, tooth brushing, toilet use, hygiene, laundry, cooking, and drinking. Figure 11 shows the number of respondents that engaged in water conservation practices within each focus area.

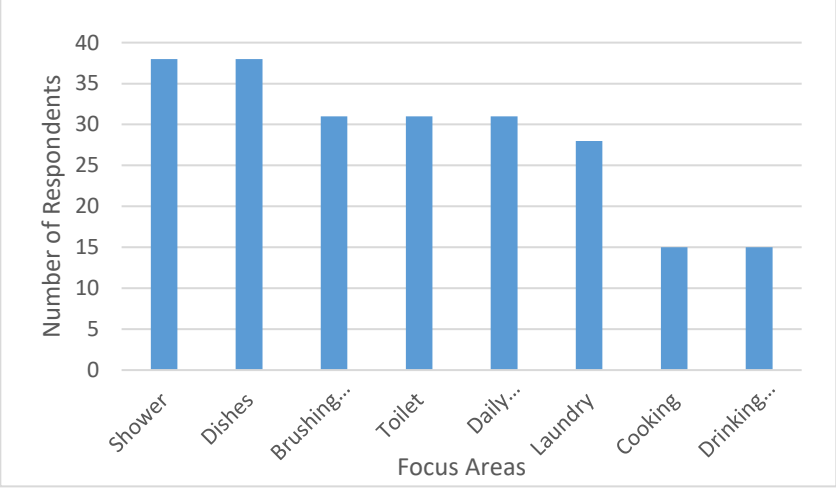

Figure 11: Number of respondents engaged in water conservation practices per focus area

Figure 11 shows that more respondents engaged in water conservation practices within the focus areas of high water use such as showering, dish washing and toilet flushing than in low water use areas such as

cooking and drinking. For example, 38 respondents engaged in water conservation behaviour in relation to showering, whereas only 15 respondents did so in relation to cooking and drinking. One middle-aged female respondent explained how she uses less water while she showers:

> *"I've certainly tried to cut back on the amount of times I wash my hair. Now I try and wash my hair every 4th day… I don't let it [the shower] run. I switch it on, wet myself, switch it off, wash my hair, wash my body, rinse it off, and get out the shower. Even in the gym I switch it off, I get furious when I hear people having 20-minute showers."*

Although only a few respondents associated toilet flushes with high water use, 31 respondents engaged in water conservation practices in relation to toilet use. One young adult male mentioned that he flushes with a bucket to save water:

> *"I have also tried to cut down flushing the toilet. So instead of flushing from the cistern, I just flush from the bucket because I realized [that] we have a very big cistern - its huge, I think it's almost 15 litres".*

While such detailed knowledge and creativity was common amongst some respondents, others did not consider toilet flushing as an area where they would reduce their water use. As a young adult male said:

> *"When I think of water conservation, toilet flushes is an unavoidable water consumption, like there's really nothing you can do about flushing. Showering you can cut down, you can wash your dishes with less water, but you can't with toilet."*

The public campaign made water conservation in relation to toilet flushing a major concern and tied it to the saying that "if it's yellow, let it mellow. If it's brown, flush it down". Some respondents pointed to hygiene and sanitation concerns for their hesitance to 'let it mellow'. One young adult male said:

> *"I find it horrific to think about going to the loo, and I see that someone has been there and they haven't flushed, like I'd rather not use it. I'd hold my pee but of course that's not an option. I don't agree with that. Have doctors approved it? It's unhygienic."*

Another message in the public campaign was for people to use grey water - i.e. dirty water from the shower – to flush the toilet. This would require that the person collects grey water during their shower, stores the grey water, and tips it into the toilet bowl or cistern as a means of flushing. The water conservation measure to use grey water is a lot more extensive than reducing the number of flushes or the quantity per flush. The above data analysis, which captures the number of respondents who did water

conservation within a focus area, does not distinguish between the water conservation measures that a respondent may take. However, a closer look into the data set shows that out of the 31 respondents that engaged in water conservation in relation to toilet use; 14 respondents reduced the number of flushes, one person used only grey water to flush, and 15 respondents reduced the number of flushes *and* used grey water to flush. Thus, when looking into the respondents who engaged in each type of water conservation in relation to toilet flushing, for example, it becomes clear that *how* a respondent chose to conserve water may differ greatly and that an analysis, which can capture these details, will provide a better understanding of the barriers and enablers to water conservation. I therefore decided to develop a coding system that could capture such details; it is presented in the next section.

5.2 Extent of Water Conservation Behaviour

This section will use the coding system to analyse the water conservation behaviour and the analysis will give insight into the water conservation behaviour in relation to each focus area as well as the extensiveness of this behaviour.

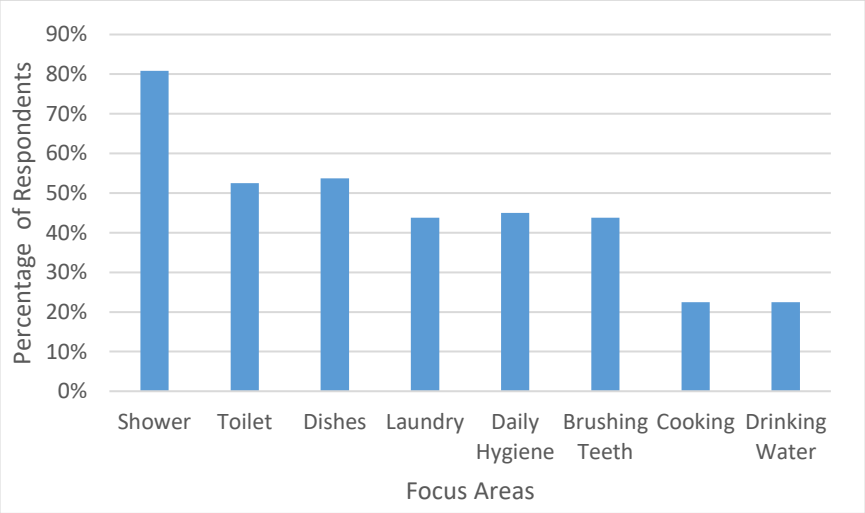

Figure 12: Percentage of Water Conservation Behaviour in each focus area

Figure 12 presents a downward trend of the *extent* of water conservation in relation to showering (highest) to drinking (lowest). It also shows that there is a 26% drop between water conservation behaviour in relation to showers (81%) and the second highest area of water conservation, namely dish washing (55%); and a second big drop – of 21% - between laundry, daily hygiene and tooth brushing (all at 44-45%) to cooking and drinking (23%).

Figure 12 also shows that reduced water use is most common in relation to showering and least common in relation to cooking and drinking water. The analysis also shows more willingness to reduce water use through changed behaviour in relation to showering than in relation to toilet flushing and dish washing.

Taking the analysis one step further, table 6 below shows the extensiveness of water conservation within each focus area. It is based on the coding system of the number of water conservation actions within each focus area (see also table 4 in Chapter 2, page 39) and shows, amongst other, that while dish washing is the second most common area of water conservation It is more common for the respondents to use all the available water conservation actions under the toilet flushing focus area than in relation to the dish washing focus area.

Water Conservation Behaviour	Points Achieved per Focus Area			
	0 Points	**1 Point**	**2 Points**	**3 Points**
Showering	5%	8%	28%	60%
Dish washing	8%	73%	20%	N/A
Toilet flushing	23%	35%	42%	N/A
Laundry	33%	48%	20%	N/A
Tooth Brushing	20%	73%	8%	N/A
Daily Hygiene	23%	65%	13%	N/A
Cooking	63%	30%	8%	N/A
Drinking	63%	30%	8%	N/A

Table 6: Overview of the extensiveness of water conservation behaviour per focus area.

Keeping in mind that the shower focus area was the *most* common one for respondents to engage in water conservation, it is interesting to note that it is also the focus area where *most* respondents report the *most* extensive water conservation practice. In the second highest focus area, dishes, almost three out of four respondents used the start-stop washing method or a plug in the sink while a few would recycle the dirty dish water. Almost one out of four respondents did not use any water conservation method in relation to toilet use, almost every second respondent had reduced the number of flushes and used grey-water to tip into the toilet/cistern. In relation to laundry, almost every second respondent had reduced the frequency of loads per week or used an eco-friendly wash setting, while 20% did both. For tooth brushing and daily hygiene, the majority of the respondents used start-top washing or a cup but let the water go down the drain, whereas a small percentage would catch and reuse the dirty water for toilet or watering the garden. Keeping in mind that cooking and drinking are the *least* common areas for

respondents to engage in water conservation, it is notable that few respondents would both reduce and reuse the water.

5.3 Adoption of Technical Solutions

In the 'Think Water' campaign, the City of Cape Town raised awareness on the "Top Ways to Save Water Indoors" which included technical solutions that would reduce water consumption in relation to shower, toilet flushing, and laundry. The technical solution for the shower was a low flow showerhead whereas there were two options in relation to toilet use; the easy solution was to place a heavy weight such as a brick inside the toilet cistern whereas the more comprehensive solution was to acquire water efficient toilets such as multi-flush toilets. In relation to laundry, the technical solution encouraged by the public campaign was to use water efficient washing machines. On social media, a 'Do It Yourself' technical solution was also encouraged, namely re-routing dirty laundry water from the washing machine into plastic basins to then be used for toilet flushing or watering gardens. The results for the adoption of these technical solutions by respondents are presented below.

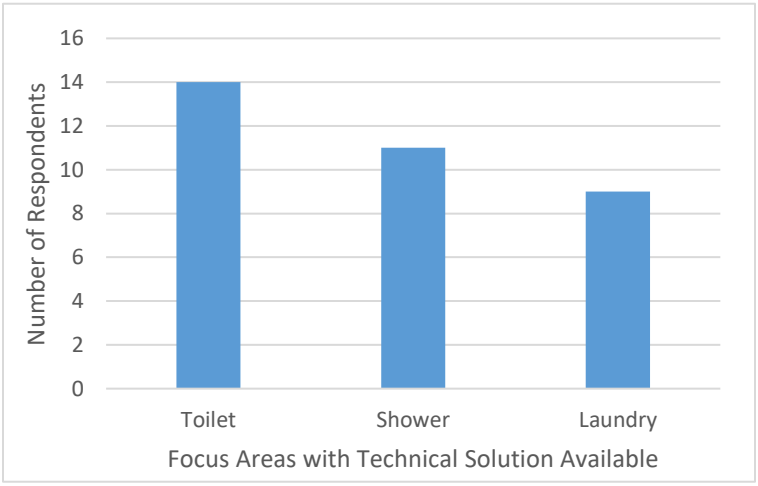

Figure 13: Number of respondents who adopted at least one technical solution in each focus area

Figure 13 above shows that in the toilet focus area, 14 respondents adopted at least one technical solution, whereas 11 respondents adopted the low flow showerhead, and 8 respondents used a water efficient washing machine or re-routed laundry water from the washing machine into plastic basins. While more respondents have adopted one technical in relation to toilet flushing, Table 7 below shows that only a few respondents adopted all the available technical solutions in relation to toilet flushing.

Focus Area	Points Scored	Maximum Points per focus area
Shower	11	40
Toilet flushing	17	80
Laundry	9	80

Table 7: Points scored in data set for each focus area and maximum points per focus area related to technical solutions

Turning this information into percentages, Figure 14 below shows that the adoption of all technical solutions available is highest in relation to shower, followed by toilet flushing and then laundry.

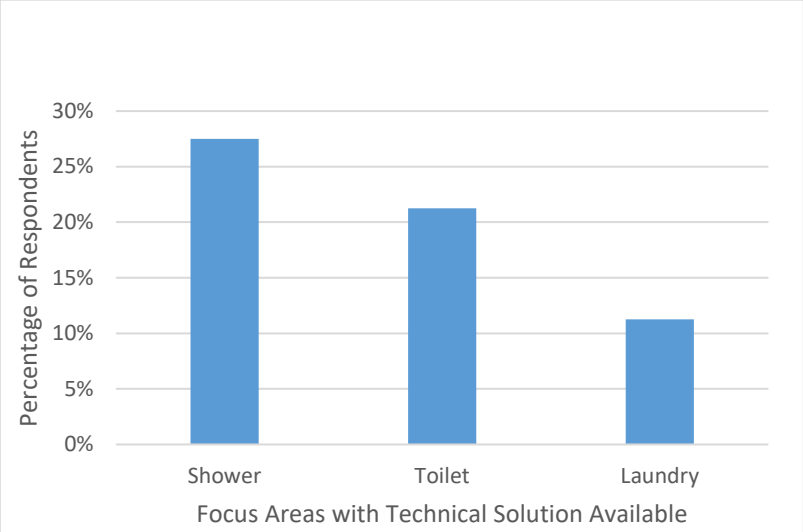

Figure 14: Adoption of total Technical Solutions per Focus Area expressed as a Percentage

Once again, this level of analysis does not inform about the technical solutions adopted under the toilet and laundry focus areas which both had the option of two mutually exclusive technical solutions – either an easy Do-It-Yourself technical solution or an expensive comprehensive technical solution. The extensiveness of the adoption of technical solutions is presented in table 8 below.

Number of Points Achieved per Focus Area	0	1	2
Shower	72%	28%	N/A
Toilet	65%	28%	8%
Laundry	80%	18%	3%

Table 8: Overview of the extensiveness of adoption of technical solutions per focus area

Whilst most respondents had not adopted a technical solution to reduce their water consumption, those who did adopt a technical solution used the easy and cheaper solutions of placing a heavy weight in the

toilet cistern or rerouting dirty laundry machine water. Only a fraction had made financial investment in the water efficient toilet or a water efficient laundry machine.

5.4 Water Conservation Behaviour versus Technical Solutions Adopted

The next analytical step is to make a brief comparison between water conservation behaviour and adoption of technical solutions within the data set in order to gain a better understanding of the ways in which respondents have made use of the available options. Figure 15 below shows a comparison between the respondents' water conservation behaviour and technical solutions adopted for the three focus areas that involve both measures of reducing water consumption.

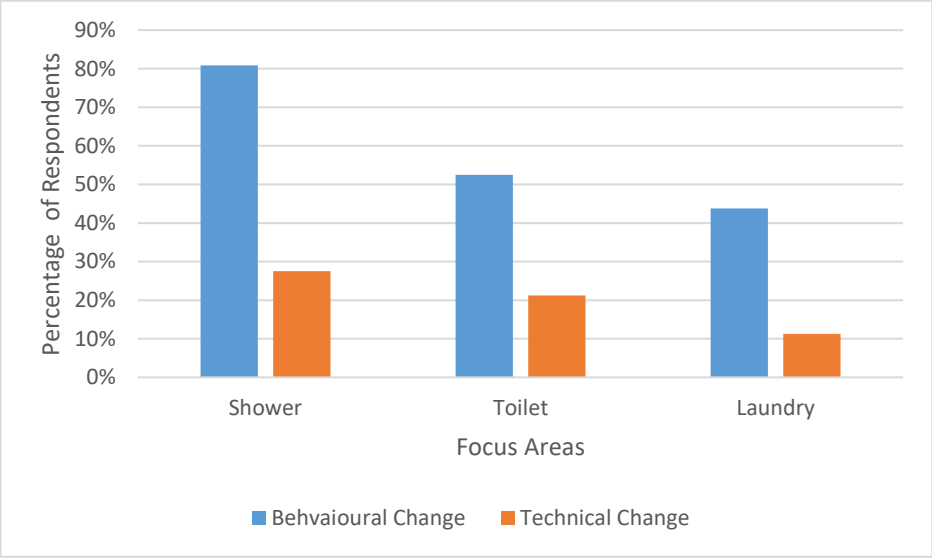

Figure 15. Comparison between Water Conservation Behaviour and Technical Solutions Adopted for each water saving focus area

Figure 15 shows that respondents have made more changes in behaviour than in the adoption of technical solutions in the three focus areas where both options are available. Following Blumstein et al., (1980), the low adoption of technical solutions could because many respondents are tenants, as a tenant's ability to make structural changes often depends upon the landlord, and due to regulations where tenants often do not have access to their monthly water bill. Other factors could be that the two machines – water efficient toilet and laundry machine – are relatively expensive. Many respondents had low technical know-how on rerouting water for reuse and awareness on the existence of the low flow showerhead. Thus there was a need for robust public education on water consumption through demand management strategies, as highlighted by Dziegielewski (2003) that public education campaigns can serve to educate the public on the existence and installation of water efficient devices.

5.5 Identification of Three Water Saver Categories

The point system showed a great range between the respondents' water conservation as the lowest scoring person got just one point and the highest scoring person got 17 points. Figure 16 below shows the variation within the data set.

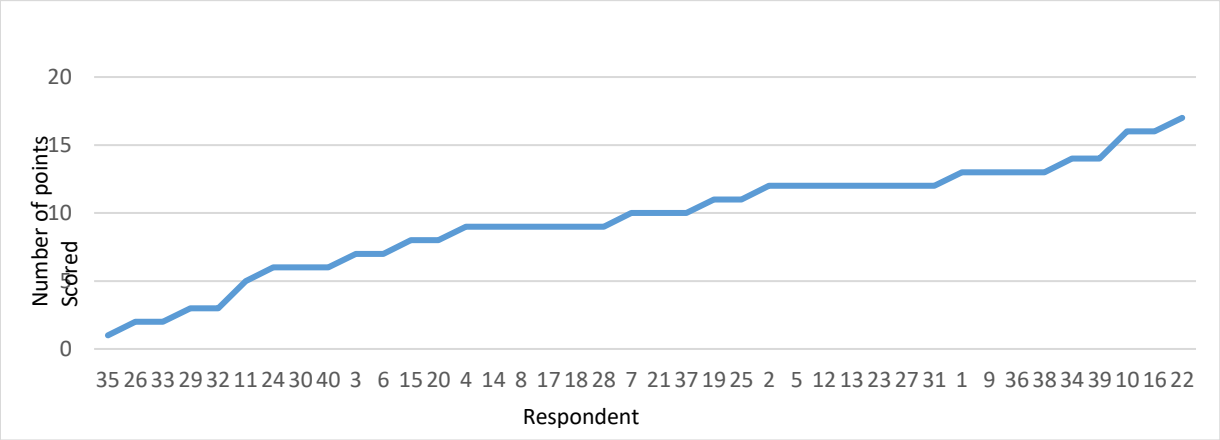

Figure 16: Number of points scored by respondents in the full data set

In order for the analysis to bring out the nuances and understand the barriers and enablers to people with very different water conservation behaviour, I have identified three categories of water savers, which involve respectively the highest, the lowest, and the median water savers within the data set, shown in Figure 17 below.

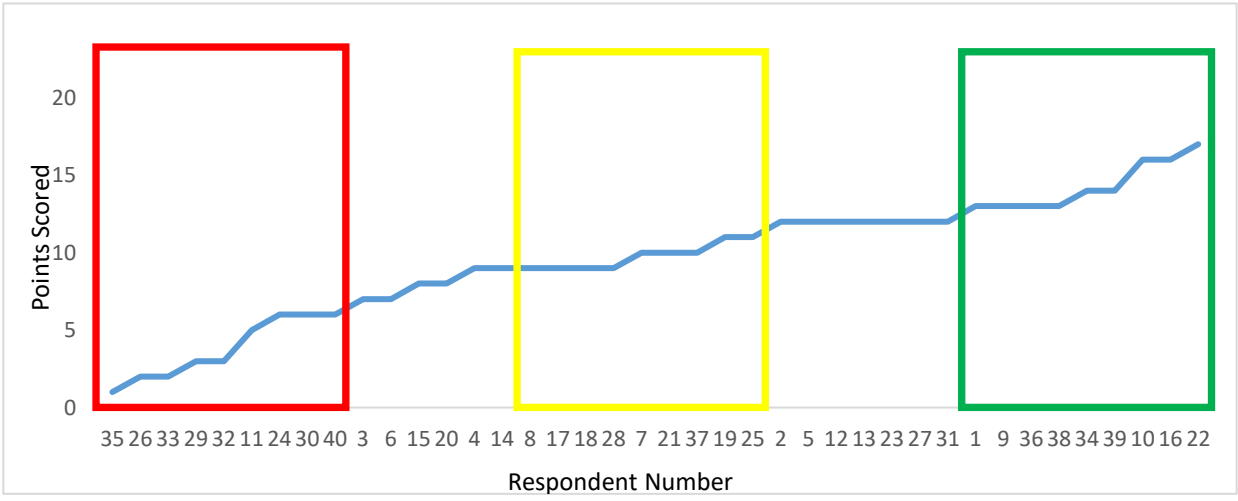

Figure 17: 'Identification of the Avid, Moderate and Low' Water Saver Categories within the full data set

The '**Avid water savers'** consists of the 9 respondents with the **most** comprehensive water conservation practice (12-17 points each; equivalent to 52-74% of water conservation). The '**Low water savers'** consists of the 9 respondents with the **lowest** water conservation practice (1-6 points each; 4-26% of water

conservation), whereas the **'Moderate water savers'** consists of 9 respondents with the '**middle**' water conservation practice (9-11 points each; 39-48% of water conservation). The three water saver categories are an analytical tool that has been used for an in-depth analysis in the results chapters.

5.6 Water Conservation amongst the Three Water Saver Categories

The final step of the data analysis is to capture the main trends of water conservation amongst the respondents. Based on a division of the nine highest scoring respondents into the category of the 'avid water savers', and the nine lowest scoring respondents into the category of 'low water savers', we can begin to understand the pattern of the highest and the lowest water conservation within the data set. We add the nine respondents' total points that fall in the middle of the two extreme categories into a category of 'moderate water savers'. Each category presents nine respondents and the purpose is to gain a better understanding of the water conservation trends within the data set. Figure 18 below illustrates the water conservation behaviour according to the three water saver categories.

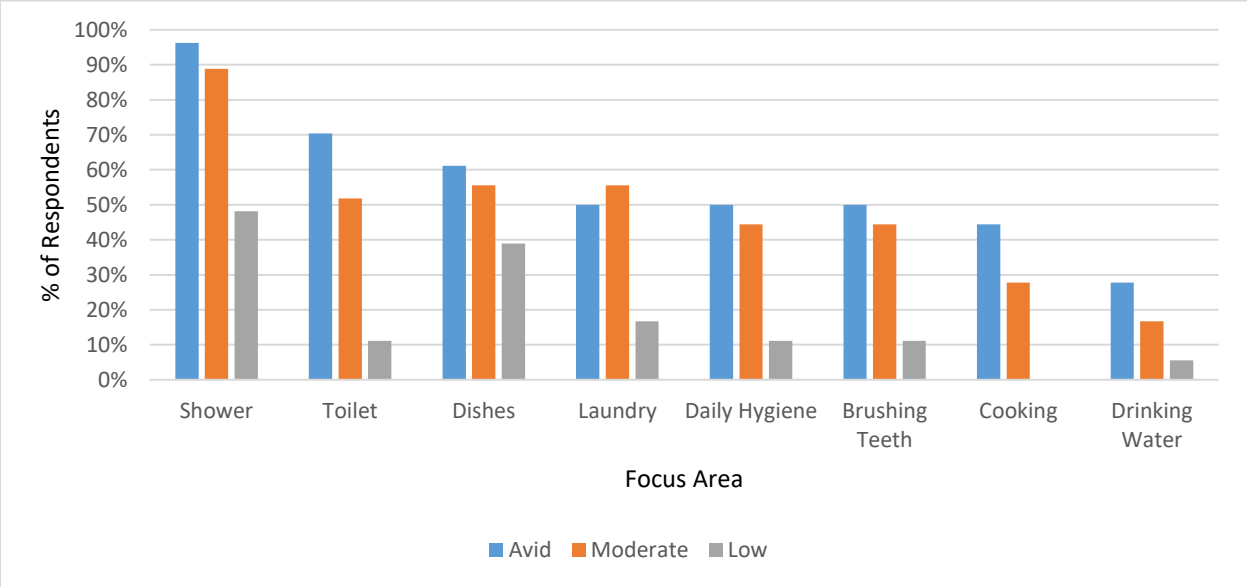

Figure 18: Water conservation behaviour for Avid, Moderate and Low Water Saver Categories

Figure 18 presents some interesting findings around the differences between 'avid' and 'low water savers'. For instance, the results show that water conservation actions in the shower focus area seem relatively easy for all respondents, regardless of whether they are 'avid, moderate or low'. Second, the results show that 'low water savers' are especially resistant to water conservation actions in the toilet flushing focus area and the cooking focus areas. Finally, the results show that the 'avid water savers' and 'moderate

water savers' water conservation actions are similar in all focus areas except in the toilet and cooking focus areas.

It is obvious that the 'avid water savers' engage in more water conservation behaviour than the other two water saver categories. Furthermore, the three water saver categories all follow a downward trend and with a steep drop in the water conservation behaviour between the highest and the second highest focus area, namely between shower and toilet flushing. That said, the three water saver categories had an almost similar adoption rate of technical solutions for toilet flushing, as Figure 19 below shows.

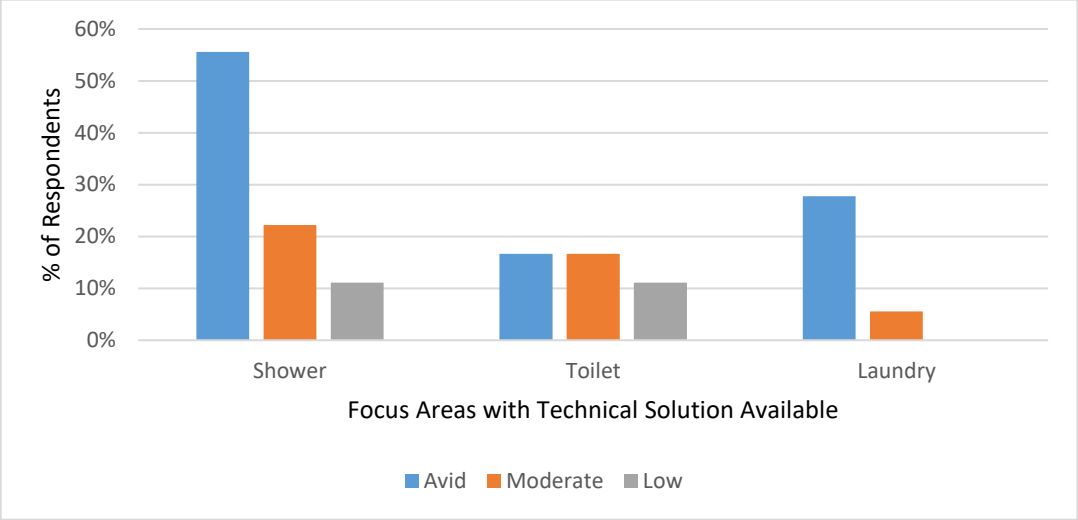

Figure 19: Adoption of technical solutions by Avid, Moderate and Low Water Saver Categories.

Whilst the three water saver categories had rather similar adoption rates of technical solutions in relation to toilet flushing, there were stark differences between adoption of technical solutions in the other two focus areas. The 'avid water savers' had the highest adoption rate (70%) with regard to the shower focus area, whereas the 'moderate water savers' and 'low water savers' had a 15% adoption rate. It is striking that the 'avid water savers' are the only respondents, except one 'moderate water saver', who rerouted dirty washing machine water into plastic basins using a Do It Yourself solution, and that none of the 'low water savers' used any technical solutions to reduce water use in relation to the laundry focus area.

5.7 Discussion Section

First, the analysis established that the most common and extensive water conservation behaviour was in relation to showering, toilet flushing and dishwashing. According to Katz et al., (2016), communication is critical in water-conservation strategies that aim at persuading households to conserve water resources

(Katz et al., 2016). In this case, the City of Cape Town's public water conservation campaign emphasized water conservation in these very areas of everyday life, hence we may attribute the campaign to the behaviour change. The finding also corresponds with the scholarly consensus that public education through mass media campaigns on an environmental concern is critical for individuals to reduce water consumption (Dziegielewski 2003; Van Poeck and Vandenabeele, 2012; March et. al., 2015; Seyranian et al., 2015; Addo et al., 2018).

Second, the analysis shows that the respondents generally engage more in water conservation behaviour than adoption of technical solutions. This is an unexpected finding, as the adoption of technical devices - such as the low-flow showerhead and the heavy weights placed inside the toilet cistern - are 'one-time fix', relatively inexpensive, readily available and easy to install with low demands on technological know-how whereas water conservation through behaviour must be done repeatedly and consistently. This assumption drew on a notion that individuals often engage in pro-environmental behaviour that requires minimum effort, cost or sacrifice to themselves (Dziegielewski, 2003). Perhaps the finding tells us that it is still more easy to adopt behaviour change that do not require special skills or resources than acquire new technology. The low adoption of technical devices will be discussed more in-depth in Chapter 7.

The literature points to several reasons for the low adoption of technological devices that enhance water conservation. First, the element of a *technical* barrier, where respondents may view these technical devices with hesitation, as most water efficient technology requires a certain level of technical know-how and ability to install and maintain the devices (Gardiner, 2009; Antwi-Agyei, et al., 2015). Second, the element of a *financial* barrier, where respondents might associate the adoption of these technical devices as being too expensive. Finally, an *institutional* barrier, tenants often require a permission from the landlord to make structural changes to the premises, such installing a low-pressure showerheads. Hence the status of residence (owner or tenant) can limit the technical solutions that a person may use in terms of water conservation (Blumstein et al., 1980 p.3).

Chapter 6: Perceptions on the Cape Town water crisis and self-efficacy on its alleviation

This chapter responds to Objective 1 that seeks to "*Determine how Cape Town residents perceive the water crisis and their role in it*".

The chapter builds on the literature concerned with the use of public education on environmental crisis as a basis for individuals to change attitude and practice in relation to water consumption. Drawing on Dziegielewski (2003), public education is a strategy that a government can use as part of water demand management since the public education would provide information on the need to conserve water and on water conservation. Public education can use various communication strategies such as mass media advertising campaigns and promotional campaigns and events (Dziegielewski 2003:32). Public education campaigns may reinforce other water demand management strategies (Dziegielewski, 2003:37), which was the case in Cape Town where the public education campaign was used to also reinforce government water restrictions. Ziervogel et al., (2010) pay attention to the role of the implementing institutions in making public education effective and lead to change in water use, whilst Dziegielewski points out that the demand management measures must be acceptable to the general public and correspond with the water supply situation in the community (Dziegielewski, 2003:33).

The first section of the chapter will focus on the respondents' perceptions of the water crisis and *how* they gained knowledge about the water crisis and water conservation. The second section moves on to the respondents' perceptions of their own water use in order to get insight into *what* the respondents know and establishes the similarity and disparity between the three water saver categories. While this thesis attributes knowledge as having the ability to influence behaviour, which is why it is relevant to look into perceptions, the thesis also views knowledge 'as a modifier of attitudes and values' (Fietkau and Kessel 1981 in Kollmuss and Agyeman (2002: 246) and recognises that other factors also influence people's behaviour towards water conservation (Kollmuss and Agyeman, 2002: 241). Drawing on literature concerning self-efficacy, the third section turns to the respondents' perceptions of their own ability to contribute to resolving the water crisis. The overall argument of the chapter is that the data analysis shows a correlation between knowledge about water conservation and notions of self-efficacy to resolve the crisis. Whereas water conservation is part of the identity of the 'avid water savers' and they hold detailed knowledge about it, the 'low water savers' had limited knowledge and did not view themselves as part of the solution to the crisis.

6.1 Perceptions of the water crisis

The interviews began with an inquiry into the respondent's overall perception of the water crisis and later on inquired about how they gained knowledge about it. This section follows the same structure.

Figure 20 below shows that all the respondents were aware of the drought in the City of Cape Town and the Western Cape at the time of the interview.

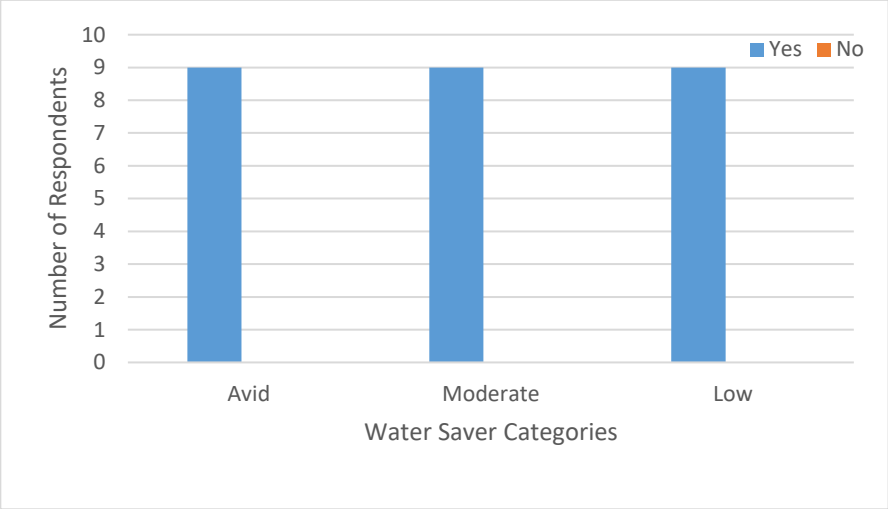

Figure 20: Awareness of the water crisis in Cape Town and the Western Cape

The respondents learned about the water crisis and water conservation techniques through mainstream media, social media, and their social networks. 9 out of 9 'avid water savers' responded that they used a combination of all three information streams (mainstream media, social media and social networks). 7 out of 9 'moderate water savers' responded that they used mainstream media, 4 out of 9 responded that they used social media and 4 out of 9 responded that they gained knowledge from their social networks. 5 out of 9 'low water savers' responded that they used mainstream media, 2 out of 9 responded that they used social media and only 1 out of 9 responded that they gained knowledge from their social networks. Furthermore, the respondents in all three water saver categories had gained knowledge from billboards and public signage, for example electronic billboards on highways with neon messages on the current dam level such as "Water Crisis: Dam Levels 26%" and many commented that it would have been helpful if public signage also gave information on how to conserve water. As one young female 'low water saver' said:

> *"Don't just give us messages saying save water, but how? When you flush you use a certain amount of water. People don't know that. That's why every time they go pee, a person is just out here flushing".*

Similarly, a young female 'moderate water saver' commented on the large sign at UCT's lower campus that read 'The Cape Town water crisis is real and so is our commitment to be sensitive',

> *"I do feel like there could be more constructive advice on how to save water. I think that would be a good message that isn't really getting across".*

In terms of mainstream media, 'avid water savers' reported choosing to actively listen to radio talk shows dedicated to awareness raising about the water crisis, among others by listeners calling in to share ideas on water conservation. An adult female 'avid water saver' said "*I think radio stations like Cape Talk are doing a lot to try and constantly broadcast ideas"* and a young female 'avid water saver' said "*I usually listen to KFM or 5FM and there's been a lot of stuff on KFM being a Western Cape radio station".* Conversely, none of the 'low water savers' reported tuning into such radio talk shows.

The 'avid water savers' and the 'moderate water savers' relied on their personal social networks to learn about the water crisis to a much larger extent than the 'low water savers' who generally did not talk about the water crisis and water conservation techniques with their friends and colleagues. A young female 'moderate water saver' said:

> *"I wouldn't say that it's the mainstream media that's influenced my water usage. We have people at work who are very passionate and will send tips to all of us or they'll send dam levels, so that's where my information about the drought is coming from".*

A young male 'moderate water saver' supplemented that *"At the moment I would say face to face conversations are much more effective in raising this issue of water usage. I have actually been having quite a few of those conversations".*

While the 'avid water savers' and 'moderate water savers' used similar media to gain information about the water crisis and water conservation, the 'avid water savers' were a lot more committed to search for, and make themselves receptive to updates and new water conservation techniques in newspapers and radio shows, and also searched for updates using online resources such as online news articles and social media updates. . A young male 'avid water saver' said:

> "*It's between all the social media, newspapers, print, all the platforms where you receive some kind of information, you can sense there's a trend, and that's made me more conscious. That encouraged me to change my behavior".*

The results have shown that all the respondents were aware of the water crisis and had gained information from the public awareness campaign, which centered on the existence of the water crisis. Thus, the results follows the point made by Dziegielewski (2003) that a public education campaign can form the basis for increased water conservation. The 'avid water savers' and 'moderate water savers' used a combination of mainstream media, social media and personal social networks to gain more information about water conservation. It is notable that the 'avid water savers' were more committed to continuously look for information than the 'moderate water savers'.

6.2 Perception of individual water use

This section moves on to the respondents' perceptions of their own water use in order to get insight into *what* the respondents know and establish the similarity and disparity of knowledge of individual water use between the three water saver categories. The section begins with a focus on the respondents' knowledge about the water restrictions at the time and about water conservation techniques, and ends with paying attention to the respondents' perceptions of their own water use.

At the time of the data collection, the City of Cape Town had implemented the Level 5 water restrictions that gave a daily quota of 87 litres per person, which was announced on public media, especially on radio, and social media. The respondents were asked about their knowledge on the current water restriction, and, as Figure 21 below shows, the 'avid water savers' were generally aware of the daily quota whereas only one third of the 'moderate water savers' had such knowledge and all of the 'low water savers' said that they did not know or gave answers that were far from the daily quota.

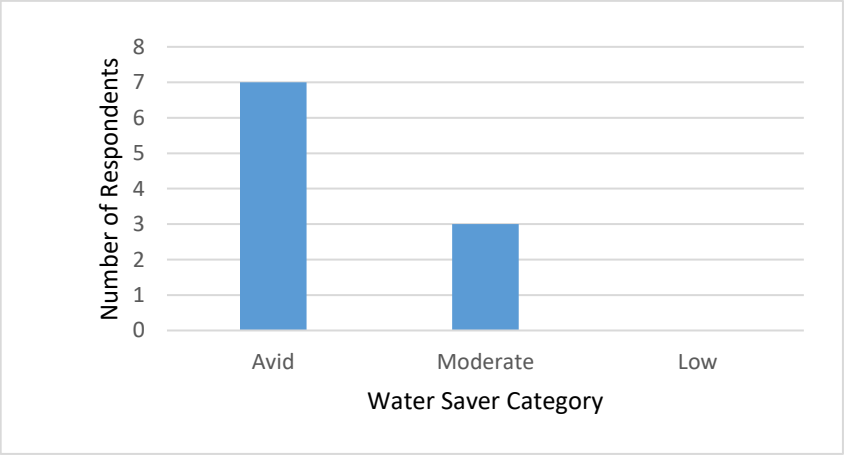

Figure 21: Knowledge among respondents of water restriction of 87 litres per person per day

Besides having more knowledge on the current water restriction, the 'avid water savers' and the 'moderate water savers' generally responded that they had a lot of knowledge on water saving techniques whereas all of the 'low water savers' said that they know little about water conservation. Figure 22 below gives a graphic overview of the finding to this issue.

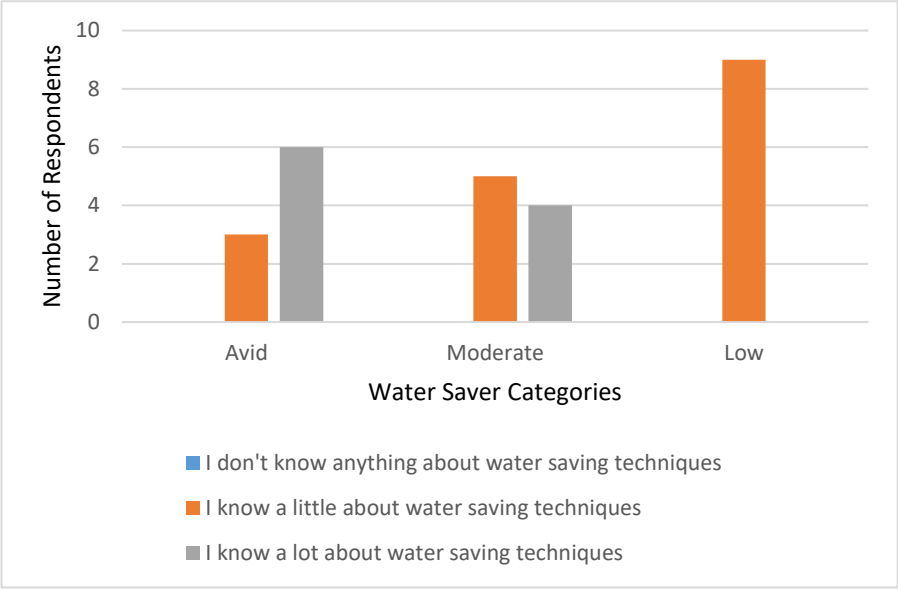

Figure 22: Respondents perceptions on personal knowledge about water saving techniques

The confidence amongst the 'avid water savers' about being well informed on the water restriction and water saving techniques extends to their perceptions of their own water use. Figure 23 below shows that eight out of the nine 'avid water savers' believe that they use less than 87 litres of water per day whereas this estimation is much lower amongst the other two water saver categories.

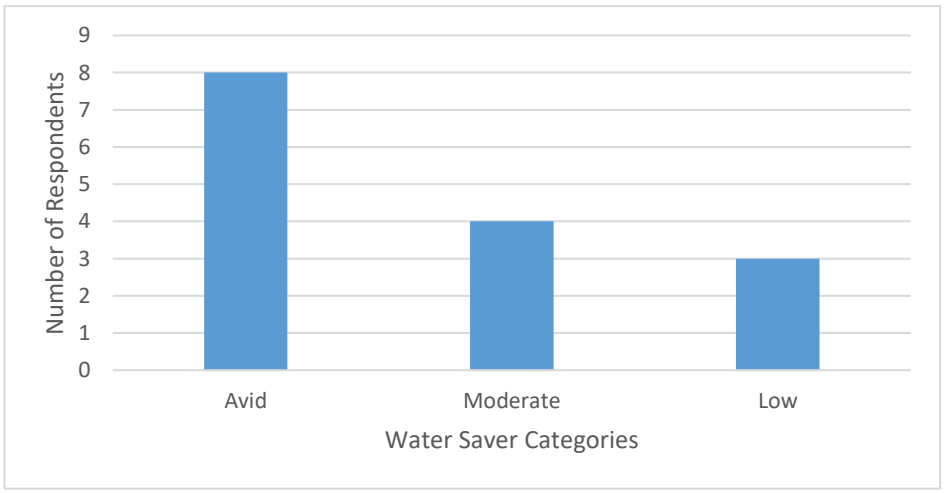

Figure 23: Respondents who estimate that they use less than 87 litres of water per day

It is relevant to make three remarks in relation to the respondents' estimation of their own water use. First, following the limited knowledge about the daily water restriction, six 'low water savers' and four 'moderate water savers' responded that they were unable to estimate how much water they use per day. Second, the four 'moderate water savers' who estimated they use less than 87 litres of water, based this estimation on their water conservation practices related to the shower, toilet, and laundry focus areas. Third, eight 'avid water savers' estimated that they use less than the daily quota and based their estimation on rather detailed tracking of their own water consumption. An adult female 'avid water saver' speaking about collecting her dirty laundry water and monitoring her water use said "I have a big container, because if there are two laundry cycles there will be 30 litres at a time depending on your washing machine". In addition, seven 'avid water savers' had access to their monthly water bills, whereas this was only the case for one 'moderate water saver' and two 'low water savers'. It is common in the City of Cape Town that tenants do not have access to their monthly water bill because the responsibility of payment rests with the landlord and water consumption is usually included in the standard rent. On the other hand, the 'avid water savers' with access to their monthly water bills live in their own houses and thus receive their water bill; they can monitor water consumption and would benefit financially from less water use. For some 'avid water savers', monitoring their water use is part of ongoing conversations within their social relations, as for example one adult female said that she and her sister had a monthly competition about water saving: "Now every month I want to know what our water rates are. So it's like 'come on, we can get it lower'. So there's this little bit of competition between us". Whilst some very committed people may make water use part of their social relations, it is recognized that lack of information about one's water consumption discourages water conservation, as also pointed out by Blumstein et.al. (1980).

Summing up, the 'avid water savers' have more general knowledge on the water restrictions, water conservation techniques, and they are conscious about their own water use; whereas the 'moderate water savers' have general knowledge about water restrictions, reasonable knowledge on water conservation, and while they make some efforts, they remain unemotional about water conservation. The 'low water savers' have less knowledge about the water restrictions and water conservation techniques and they are less concerned about their own water use.

6.3 Perception of self-efficacy to alleviate the water crisis

Moving beyond the focus on knowledge as an influencer of water conservation, this section turns to the respondents' perceptions of their personal ability to contribute to resolving the water crisis. The section

will first look into the respondents' views on the importance of water conservation and the influence of their personal water conservation measures to resolve the water crisis. Building on literature concerned with motives and values for water conservation, the section will draw on the concept of self-efficacy.

The second question in the interview guideline was concerned with the respondents' views on how much they care about saving water. Figure 24 below shows that all nine 'avid water savers' are passionate about saving water, whereas only four of the 'moderate water savers' and three of the 'low water savers' said that they are passionate about water conservation. It is interesting to observe that there are an equal number of five respondents in each of the 'moderate' and the 'low' water saver categories that said that they 'care a little about saving water'. Just one 'low water saver' said that he did not care about saving water.

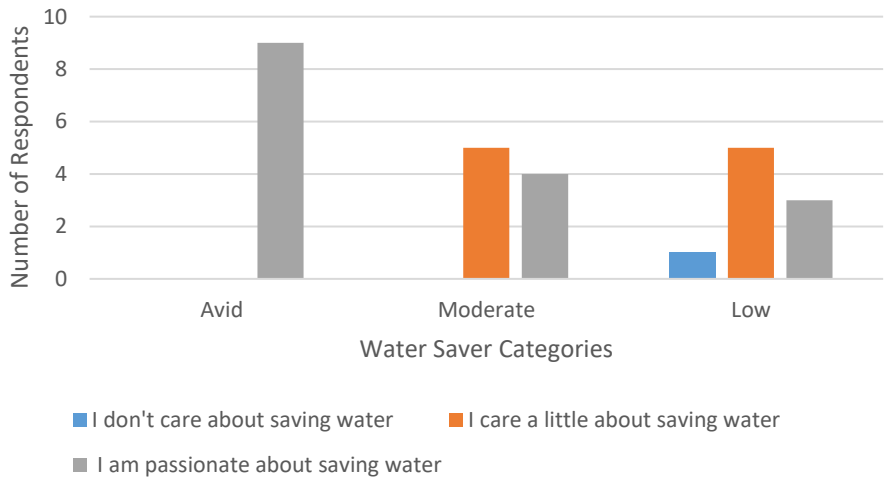

Figure 24: Respondents views on how much they care about saving water

The findings to this question are in line with the practice and the knowledge about water conservation seen amongst the 'avid' and the 'moderate' water savers presented in this and the previous chapter. The 'avid water savers' identify as being passionate about water saving due to their connectedness and devotion to nature, the environmental self-identities they have attributed to themselves and due to the biospheric values they hold. Schwartz (2012) describes biospheric values as the concern "for the welfare of those in larger society and world and for nature" (Martin & Czellar., 2017:57). As a young female 'avid water saver' said:

> *"I'm conscious and passionate because that's just the type of person I am. I am very into the environment, so that's a big driver. I think everybody should do their best. We all live in this*

place, we all have an obligation to look after it and protect it. Not only for our children, but also for other people's children. We've got to start living unselfishly".

Another adult female 'avid water saver' said "*I just like to be self-sustainable and because I just like the idea of not wasting things for my God".*

Amongst the 'moderate water savers', on the other hand, four people identified with being passionate about saving water and five people said that they 'care a little about saving water'. As a group, they engage in water conservation practices and are quite knowledgeable but not on an emotional level, like the 'avid water savers', yet more committed than the 'low water savers'.

It is notable that while six 'low water savers' responded quite predictably that they care a little or do not care about saving water, three 'low water savers' said that they are 'passionate about saving water'. The reason could reflect that it was the second question in an interview that focused on the water crisis, hence the person had not yet talked about his or her water conservation practice, and, moreover, it was somewhat apparent that this was the morally correct response.

While the practice of the three 'low water savers' does not reflect passion to saving water, it is certainly the case amongst the 'avid water savers' where this passion has become part and parcel of daily life. It follows that, when asked about their ability to contribute to resolving the water crisis, all nine 'avid water savers' said that they think that they can make a difference. Interestingly, seven 'moderate water savers' and six 'low water savers' gave the same response, as shown in Figure 25 below.

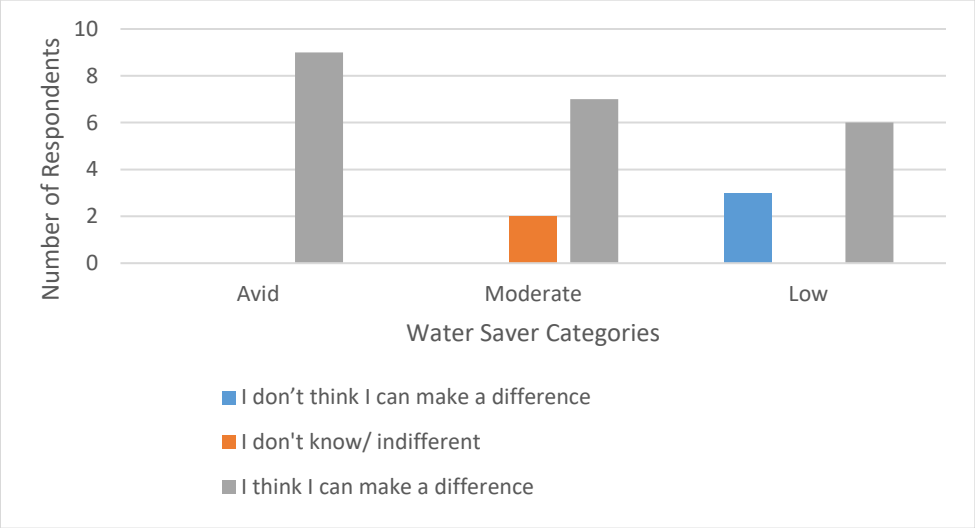

Figure 25: Respondents' perceptions of ability to make a difference (self-efficacy)

Kollmuss and Agyeman (2002) highlight a person's perception of their ability to bring about change through their behaviour as a key determinant of the person's pro-environmental behaviour. They refer to

this, as “locus of control” where a person with a strong *internal* locus of control has a high sense of self-efficacy i.e. belief that their actions can bring about change. Conversely, an individual with an *external* locus of control will have a sense of low self-efficacy (Kollmuss and J. Agyeman*: 2002, 255).* Thus, when an individual is convinced about the value of his or her contribution to resolving a water crisis, the person would be more likely to conserve water (Dziegielewski, 2003:33). The ‘avid water savers’ have a strong locus of control and high self-efficacy in the sense that they believe their water conservation contributes to solving the water crisis. As a group, they are confident that their actions will make a difference. As one young male ‘avid water’ said:

> *“Me, as an individual, it's like a drop in the ocean. But I can't encourage other people to save water if I’m not doing it myself. It starts with an individual, and by living that lifestyle, then you encourage other people”. He goes on to say that he is motivated to conserve water because “Humans suck, we're idiots and we're literally destroying the planet.”*

The sense of self-efficacy amongst the ‘moderate water savers’ was weaker. Although seven ‘moderate water savers’ said they think they can make a difference, they tended to be less confident.
As one young adult male ‘moderate water saver’ said:

> *“I feel like I can make a difference but I’m not sure if I am. I am in that situation where I don’t know.”*

The respondents in this water saver category expressed other forms of doubt in the influence of their own actions, as one young adult female said:

> *“I would say the second option. About being indifferent. For me, it goes back to the whole idea that you always think that if I don't finish the water, someone else will. That does not mean that I am super excessive about leaving the tap running, but just making the effort to fully conserve water, it would take a lot more.”*

This perception that other people may use excess water reflects the theory of the ‘tragedy of the commons’ and discourages making that extra effort to save more water.
The sense of self-efficacy amongst the ‘low water savers’ is somewhat puzzling. Six respondents say that they can make a difference with regard to water conservation yet the previous chapter has shown they don’t do so and this chapter has showed low levels of knowledge about water conservation techniques. The reason could be attributed to a sense that resolving the water crisis is not their problem; it is the task of the government. As one young female ‘low water saver’ said:

"Cape Town is the biggest tourist destination and they'll have to make a plan. They probably already have a backup plan that we don't know about. I do not think that we're going to run out of water in Cape Town. I don't think the DA will let that happen because this is the only province that controls elections next year and the oceans right there. There are so many ways that you can purify water from the ocean, so I think they will make a plan."

A young male 'low water saver' expressed similar perception that the government will find a solution:

"I think water will continue being supplied. I really have a feeling that the city will find alternative ways of supplying water. I've heard through various circles about possible solutions; a water canal or pipe to Cape Town, some were saying we could process seawater and stuff, so I think that at the end of the day, even if the water runs out in the dams, they will definitely find a solution. The solution is not to stay without water."

The perception amongst the 'low water savers' that the government will make a quick fix somewhat absolves them from changing their daily water consumption, which is fundamentally different from the 'avid water savers' who perceive their actions as critical for resolving the crisis. The 'low water savers' reflect the point made by Dian Spear, namely that "people will not save water unless they perceive the need to do so" (Spear, 2018). The 'low water savers' acknowledge that the water crisis is indeed a problem, however, the solutions to the crisis are magic bullets by the government hence there is no urgency for them to conserve water.

6.4 Discussion Section

The data analysis of the respondents' perceptions of the water crisis, knowledge about water conservation techniques, and sense of self-efficacy on contributing to the alleviation of the water crisis, leads to five main points, which will form the basis of the discussion in this chapter.

First, all the respondents across the three water categories were aware of the water crisis and had gained information from the public awareness campaign, which centred on the existence of the water crisis. Thus, the results follow the point made by Dziegielewski (2003) that a public education campaign can form the basis for increased water conservation. Public education can use various communication strategies such as mass media advertising campaigns and promotional campaigns and events (Dziegielewski 2003:32). Public education campaigns may also reinforce water demand management strategies (Dziegielewski, 2003:37), which was the case in Cape Town as the public education campaign was used to reinforce government water restrictions.

Second, the three water saver categories had varying levels of knowledge about the water crisis and water conservation techniques. The 'avid water savers' had most knowledge, followed by the 'moderate water savers', and then the 'low water savers'. The public education campaign provided basic knowledge, the avid and moderate water savers acquired further information. Information seeking on water conservation is part of water conservation behaviour. The results show that three water saver categories gain information about water conservation techniques in different ways. Avid water savers consume and acquired a great amount of information through various channels, and also engaged in conversations about the water crisis and techniques within their social networks, whereas the 'moderate water savers' only did so at times and the 'low water savers' rarely did so. This result can be attributed to the identities that each water saver category possesses. The 'avid water savers' identify as being passionate about water saving due to their connectedness and view the biospheric values they hold (Martin & Czellar., 2017:57) as part of their identity.

Third, the results show that access to monthly water bills may enhance water conservation. Most of the 'avid water savers' had access to their water bills and used them as a source of information on their own water consumption. On the other hand, 'moderate water savers' and 'low water savers' were mostly tenants without access to their water bill, and did not have the opportunity to accurately gauge their water consumption if they so wished. Thus, lack of information about one's water consumption may discourage water conservation, as pointed out by Blumstein et.al. (1980), and such regulations often discourage water conservation (Blumstein et al., 1980 p.3).

Fourth, 'Avid water savers' feel responsible for alleviating the water crisis. Kollmuss and Agyeman (2002) state that "people with a greater sense of personal responsibility are more likely to engage in environmentally responsible behaviour" (Kollmuss and Agyeman, 2002 p.243). With this brand of being environmentally conscious, comes the decision of an 'avid water saver' consciously seek out more information about the crisis through various mediums and through their social interactions. 'Moderate water savers' also report caring about the water crisis, albeit to a much lesser extent than the 'avid water savers'. Conversely, the 'low water savers' do not hold a pro-environment identity and thus do not engage in these conversations with their social networks as a matter of priority.

Fifth, the 'avid water savers' believe that their water conservation contributes to the mitigation of the water crisis and they have made a variety of water conservation actions part of their daily life. In fact, sense of self-efficacy and passion amongst the 'avid water savers' for water conservation appears to go hand in hand. At the other end of the spectrum, so to say, most 'low water savers' emphasised that the

government was responsible for the water crisis and for resolving it, and did not perceive the risk of the water crisis. The 'low water savers' reflect the point made by Dian Spear, namely that "people will not save water unless they perceive the need to do so" (Spear, 2018). The 'low water savers' acknowledge that the water crisis is indeed a problem, however, the solutions to the crisis are magic bullets by the government hence there is no urgency for them to conserve water.

Kollmuss and Agyeman (2002) highlight a person's perception of their ability to bring about change through their behaviour as a key determinant of the person's pro-environmental behaviour. They refer to this, as "locus of control" where a person with a strong *internal* locus of control has a high sense of self-efficacy i.e. belief that their actions can bring about change. Conversely, an individual with an *external* locus of control will have a sense of low self-efficacy (Kollmuss and J. Agyeman*: 2002, 255).* Thus, when an individual is convinced about the value of his or her contribution to resolving a water crisis, the person would be more likely to conserve water (Dziegielewski, 2003:33). The 'avid water savers' have a strong locus of control and high self-efficacy in the sense that they believe their water conservation contributes to solving the water crisis. As a group, they are confident that their actions will make a difference.

Chapter 7: Barriers and Enablers of Water Conservation

This chapter presents the barriers and enablers of water conservation in formal residential households in the City of Cape Town. The chapter builds on the results and discussions presented in Chapter 5, which reported on the respondents' water conservation behaviour and adoption of technical solutions, and Chapter 6, which reported on the respondents' perceptions of the water crisis and their role in its alleviation.

Whilst this chapter ties together the thesis, I will use the three categories of water savers as the basis for an analysis of the barriers and enablers of water conservation that led to the varied water saving practices amongst the respondents in this study. As there are people with different levels of pro-environmental behaviour in most societies, this analysis may contribute with knowledge beyond the respondents in this study.

The chapter will focus on the barriers and enablers in relation to shower and toilet use, due to space limitations and because these two focus areas are potentially high-water use in the daily life of all the respondents. These two focus areas were at the heart of the government campaign and so the respondents may have had higher levels of information on the water conservation in relation to shower and toilet use.

The overall argument to the thesis, is that a pro-environment identity combined with high self-efficacy is the most powerful enabler to water conservation within this data set because it works as a catalyst to enhance other enabling factors, such as actively seeking information about the water crisis, and engaging in conversations about water conservation within their social networks. At the same time, the biggest barrier to water conservation appears to be personal characteristics that do not embody a pro-environment identity, and which view water governance institutions with a level of suspicion and mistrust. The analysis has shown that 'low water savers' were indeed aware of the existence of the water crisis, but did not seek information about water conservation hence they lacked tangible information to make effectual changes. Also, the 'low water savers' showed unwillingness to take actions that interfered with their lifestyle and were more likely to fall victim to the 'tragedy of the commons' where self-interest outweighs the need to act for the common good. Furthermore, 'low water savers' held negative views on other people's water use and against the water governance authorities, whilst a lower sense of self-efficacy in relation to solving the water crisis further discouraged them from water conservation.

In between the two extremes of the 'avid' and the 'low' water savers, personal characteristics is also a key enabling factor among the 'moderate water savers' in the sense of commitment to water conservation though with less passion and less at stake for maintaining an environmentally conscious identity.

The argument ,that personal characteristics is the factor that can be viewed as having the most weight as either or a barrier, builds on the Norm Activation Model (Schwartz, 1977 in Abrahamse and Steg, 2009) and the Theory of Planned Behaviour (Icek Ajzen, 1985 in Abrahamse and Steg, 2009; Kollmuss and Agyeman 2002) that underscores the role of moral obligation, intentions, emotions, responsibility and priorities and 'biospheric values as the basis of environmental self-identities' (Martin & Czellar, 2017 p.57). The importance of personal characteristics imply that respondents would behave somewhat similar in other focus areas e.g. hand washing or cooking, which is yet another reason for focusing on the two main areas of water usage in everyday life.

The following sections will attend to each factor and the ways in which it presents itself as a barrier or enabler to the various water saver categories. Towards the end of the chapter, I present an overview of the barriers and enablers in relation to the three levels of water conservation.

7.1 Personal Characteristics

The dominant enabler amongst the 'avid water savers' is their personal characteristics. More specifically, 'avid water savers' embody a pro-environment identity, combined with a high self-efficacy to make a difference to the water crisis through their actions.

The role of personal characteristics in water conservation is to acknowledge that identity, personal norms, and notions of self-efficacy may prove to be barriers or enablers for different people in relation to their pro-environment behaviour because these personal characteristics influence values, priorities and responsibilities (Gaspar, 2013; Abrahamse and Steg, 2009; Kollmuss and Agyeman, 2002).

All nine 'avid water savers' said that they 'strongly agree' that they are concerned about the water crisis and all of them answered that they are 'passionate about saving water'. 7 out of the 9 'avid water savers' responded that they are 'doing everything they can to reduce their water consumption'.

As one young female 'avid water saver' said: *"I think [that] being very conscious of saving water, it's for the benefit of people in the future and for everybody else so you can't be greedy and selfish because you've got to be conscious about the people around you, and of your environment so to me it's important."*

Another female 'avid water saver' talking about her laundry behaviour said *"I wear my clothes more often. It's not a case of "oh I'll put it in the wash." I delay. So you might see me in the same thing for three days, rather than just wear it once."*

While another female 'avid water saver' said: *"When we shower, we do that by standing in that big tub, saving water. We do that for some time, and then we use that in the toilet."* Conversely, the 'low water savers' showed rather different personal characteristics. First and foremost, they have different priorities that do not include pro-environment behaviour as one of them. It is striking that 'low water savers' were likely to act in a manner that is convenient to them and that does not interfere with their lifestyle.

A male 'low water saver' said:*"One of my friends was saying they take a shower and then they collect water in the bucket, and they use that water to flush. I don't think it's something I could do. It's too much work for me, it's just too stressful to think about. I'm aware of those things and think they're really extreme, it's not like we're dying. I mean we're trying to save water, yes, but some of those measures are too extreme".*

While a female 'low water saver' said:

> *"I just think it's too much admin [hassle] like actually going and buying a bucket, and I'm leaving at the end of this year so I don't see why I'd have to buy a bucket for a few months and then use it and then what would happen with the bucket?"*

Another barrier among the 'low water savers' was their negative perception of the government's role and management of the water crisis; 4 out of the 9 'low water savers' had particularly strong views on the city council's management of the crisis, with negative opinions having the effect of spurring them to ignore the requests to conserve water. A male 'low water saver' said:

> *"I think it's very unfair for the government in Cape Town, for all these scandals to be there, and then they tell citizens "you know what, use less water, sorry, we can't help you". I just feel like it's an unfair demand. They should do more"*

A female low water saver' expressed her doubt by saying:

> *"I think with me there's that seed of doubt that is planted, where I wonder if there's a water crisis. I don't know if it's just a hoax that is just there to curb it. I don't know if they're giving us the full information"*

While another male low water saver said:

> *"I think they're trying to advocate a crisis that doesn't really exist as much as the media is advocating it …they are creating this hype that the crisis is actually worse than it is"*

Thus, the 'low water savers' limited trust in the water governance institutions, influences their personal characteristics, making this a barrier to their water conservation.

Turning to the issue of 'self-efficacy', which concerns a person's perception of their innate ability to bring about change through their behaviour (Bandura, 1968 in Kollmuss and Agyeman 2002), self-efficacious individuals usually work harder on a task and are more persistent than less self-efficacious individuals. The results showed that all 9 'avid water savers', and 7 out of the 9 'moderate water savers' perceive that their own actions to conserve water have a measurable effect on the water crisis. 2 'moderate water savers' were not sure of their own contribution to solving the water crisis.

A female 'avid water saver' said:

> *"If everyone thought they could not make a difference then no one would bother. I don't think my little contribution on its own is going to save Cape Town but if enough people believe in it then it will make a difference. I make a difference which is good for my conscience."*

While a male 'avid water saver' said:

> *"The one reason is that me, as an individual, it's kind of like a drop in the ocean. But I can't encourage or tell other people to save water if I'm not doing it myself. So it starts with an individual, and by living that lifestyle, then you encourage other people to adopt the same one"*

The 'low water savers' held a different notion of their own self-efficacy, as 4 out of the 9 individuals responded that "they do not think they can make a difference" to the water crisis. This answer category was not used by any respondents amongst the 'avid' and the 'moderate water savers'. A male 'low water saver 'said:

"I don't think I can make a difference. I feel like my water usage is insignificant to the whole picture. I just don't think that my usage is significant enough to cause the shortage to decrease at a certain rate"

While a female 'low water saver' said:

"I mean, I'm just going to be living in a dirty environment rather than actually saving water I don't think that's going to make much of a difference on a broader scale"

The view that one cannot make a difference discourages an individual from pro-environmental behaviour, which often requires inconveniencing oneself, for example to stand in a bucket during a shower and then having to pour the water into the toilet.

The section has brought out that the 'avid water savers' take an altruistic approach to water conservation, which involves inconveniencing themselves, they hold the notion of high self-efficacy and being a water saver is part of their identity. The 'low water savers', on the other hand, have other interests and priorities than water conservation, tend to blame the water authorities for the crisis, and they have little motivation to disturb their lifestyle. Following the Norm Activation Model, the 'avid water savers' reaffirm their pro-environment identity and connectedness to nature when they engage in water conservation actions, whereas water conservation is unrelated to the identity of 'low water savers'. The 'moderate water savers' engage more in water conservation than the 'low water savers' but with less at stake for reaffirming self-identity than the 'avid water savers'.

7.2 Information

Information presented itself as an enabling factor to the 'avid water savers' and the 'moderate water savers' who are 'information seeking' people as they are actively seeking and sharing information (Trumbo and O'Keefe, 2005 in Dolnicar et al., 2012:47).The results have shown that 7 out of 9 'avid water savers' identified as being Smile Water Warriors or were part of a neighbourhood water conservation group, while 3 out of 9 'moderate water savers' and 0 out of 9 'low water savers' belonged to a neighbourhood water conservation group. As one young female 'avid water saver' said:

> *"I think I know a lot about water saving techniques. I've talked to a lot of people. I've tried various things, and I think radio stations like Cape Talk are doing a lot to try and constantly broadcast ideas."*

All the 'avid water savers' have the characteristic of being' information seekers' as they speak with friends, family and colleagues about how to reduce water consumption responding that they 'know a lot about water saving techniques'. While the 'moderate water savers' are well-informed, water conservation is a less important topic in their social life.

On the other hand, information was a barrier to water conservation amongst the 'low water savers'. All of them were aware of the existence of the water crisis but they lacked tangible information; for example, only 2 out of the 9 'low water savers' knew that the daily allowable limit of water per person per day was 87 litres. This is very different from the 'avid water savers' where 8 out of 9 could answer this question correctly. Furthermore, all the 'low water savers' identified with the option that they think they know only

‘a little about water saving techniques’. The limited information on water saving techniques also translated to the result that 4 out of 9 ‘low water savers’ did not know about the existence of a low pressure showerhead as a water efficient technical device. A male ‘low water saver’ responded:

“I haven't seen that. Is it like…? So is "low pressure" like that ones where you switch on the showerhead and it has less water coming out?”

Furthermore, 6 out of 9 of the ‘low water savers’ were unaware of the technique of using a heavy weight to displace water in a toilet cistern allowing less water use per flush. Some of them showed interest in using the technique but responded that they might not be able to use it due to institutional barriers, which I will attend to in the section on institutional barriers (Section 7.6).

In brief, the ‘low water savers’ had limited information on water conservation techniques whereas the ‘avid water savers’ continuously gained new information, as water conservation techniques was part of interaction with friends and neighbours. Following the previous section, there is a clear relationship between the different environmental attitudes and the level of information acquired by all three water saver categories; the stronger the pro-environment identity, the more information about the water crisis was actively sought and consumed.

Whilst all of the respondents were aware of the water crisis in the City of cape Town, the results showed that information was an enabler to water conservation for the ‘avid water savers’ and ‘moderate water saver’ categories but a barrier to the ‘low water savers’; both in relation to basic information on water saving techniques and availability of water efficient devices.

7.3 Social

The results show that 7 out of the 9 ‘avid water savers’ identified as being Smile Water Warriors or neighbourhood water conservation groups whereas none of the ‘low water savers’ engage in social groups focused on water conservation. These social networks are closely linked to the ‘avid water savers’ identity of being water savers and being part of social networks give them a sense of community effort, belonging and pride in water conservation, which can strengthen their pro-environmental behaviour (Bissing-Olson et al., 2016:146). A female ‘avid water saver’ said:

> *“I have taught people a lot of things because of my passion for saving water. It rubs off on other people. They start to talk to me and see what I'm doing and see buckets in my house and see how*

I water my plants and it starts to trigger something in their mind. I can help other people make a difference. It starts as a mini little revolution"

Amongst the 'moderate water savers' three people belonged to a social group advocating for reduced water consumption, and no-one amongst the 'low water savers' were part of social groups that advocated for reduced water use during the water crisis. It is relevant to note that 4 out of the 9 'low water savers' had only lived 1-4 years in Cape Town at the time of the interview and they were not permanent residents. Migrants may carry attitudes and behaviour that aligns with their previous lifestyles that could have been in areas that were not prone to water crisis and they may not have a full grasp of the situation or a sense of responsibility to contribute to solving a crisis (Trumbo and O'Keefe, 2005).

Jorgensen et al., (2009) have highlighted that cultural beliefs, customs and traditions may influence how individuals consume and conserve water. The results show that these social constructs can act as barriers to water conservation as 3 out of the 9 'low water savers' indicated that their views on hygiene prevented them from following the advice by the water authorities to 'let it mellow if its yellow' as they felt a need to flush the toilet after they had used it and found it unacceptable that others would not flush after using it for a short call as well.

A Male, 'low water saver' said:

"I flush every single time. I feel it is very unhygienic and unsafe if I don't flush. All the bacteria are coming out of your body and the moment the next person goes into it he is inhaling it…. It's a social thing – hygiene - it's second nature. I've always thought 'if you go to a washroom and see that somebody hasn't flushed, you flush it down, and use the loo'. I don't know, it's like asking me to rewire how I've been socialized, and it's hard to do that"

Another male 'low water' said: *"If I see that somebody hasn't flushed I would then flush before using".*

7.4 Technological

The results show that the respondents had generally engaged more in water conservation behaviour than adoption of technical solutions. The adoption of water efficient technology may present itself as a barrier in three ways. First, the technology is an obstacle if people do not know about the technical device or do not have the technical-know how to install and maintain it. Second, the technical device may be expensive to purchase, install and maintain, thus the barrier is a combination of technological and financial barriers. Third, the adoption of the technology may be challenged by institutional barriers such as a person's place

of living or regulatory barriers that do not allow the adoption of the device. This section looks into the first aspect; awareness of the technical device and know how.

The results show that technology and associated technical-know how did *not* present itself as a barrier to the adoption of the heavy weight in the toilet cistern and a low-pressure showerhead as none of the respondents cited technical inability as a barrier to its adoption. In fact, these two water efficient technical methods are simple to understand and required a one-time action by the individual. A male 'low water saver' who otherwise displayed very low (7%) water conservation in his daily activities had adopted the use of a brick in the toilet cisterns in his house, and he explained that:

> *"[I have made] Very minimal changes, like the only things I have done to save water is to put a brick in my toilet. [I have had it for] a couple of months."*

Another male 'low water saver' who did not know about the technique of using a heavy weight in the toilet system, when asked that now that he knew about it, would he consider using it? He responded:

> *"Because it's not stressful. It's simple- you put a brick, you don't even have to think about it, you flush, and it's less water."*

The same person was unaware of the low-pressure showerhead and his response to whether he would consider using it was as follows:

> *"Yes, I would definitely [use a low pressure shower head]. I would rather replace my showerheads than bring a bucket into the shower. Like tell me to reduce the speed of my shower, tell me to replace my showerhead, but don't tell me to bring a bucket into the shower. That works for me"*

The interest in adopting a technical solution (a low pressure showerhead) instead of being inconvenienced in your daily (stand in a bucket during shower) reflects the point that many people adopt pro-environmental behaviour that requires minimal effort or sacrifice to themselves (Dziegielewski, 2003). Following this line of thought, the results were unexpected because the technical solutions such as the low pressure showerhead and the heavy weights placed inside the toilet are relatively inexpensive, readily available and easy to install without any prior technical know-how. However, as the above example shows, the low adoption of technical solutions refer to limited knowledge especially amongst the 'low water savers'. The next two sections look into the financial and institutional aspects of technical barriers.

7.5 Financial

The economic capacity of an individual to acquire, install and maintain technical devices can be a barrier to adaption of pro-environment behaviour, especially if the financial investment compromises the ability to meet basic needs (Antwi-Agyei et al., 2015; Brody et al., 2012).

In this study, financial concerns appeared to be neither a barrier nor an enabler to water conservation as the key technological devices - a heavy weight in the toilet cistern and a low pressure showerhead – are relatively cheap devices. None of the 'avid water savers', 'moderate water savers' or 'low water savers' cited financial inability to use these devices as barriers to their adoption.

A male 'low water saver said: *"I don't know how much they [low pressure showerhead] would be, but I don't expect it to be as expensive because it's just a showerhead. That I'm totally up for."*

It is an interesting finding that finance did not present itself as a barrier or an enabler to water conservation amongst the respondents, which is most likely related to the fact that the technology to conserve water during shower activities such as the low pressure showerhead and a heavy weight such as a brick are cheap to acquire, install and maintain, and that the respondents are residents in formal residential household settings and would have the financial capacity to acquire the technology.

7.6 Institutional

Most specifically to this study, institutional factors have the ability to encourage or hinder the use of technical water efficient devices in the form of structural or regulatory barriers.

The results show that 5 out of the 9 'avid water savers' had adopted the technique of using a low-pressure showerhead, whereas just 2 out of the 9 'moderate water savers' had adopted this technique. It is notable that 4 out of the 5 'avid water savers' who had adopted this technology were homeowners with freedom to make the physical change to their premises. Thus being a homeowner can be viewed as an institutional enabler.

Along a similar line, the 4 out of the 9 'moderate water savers' and the 3 out of the 9 'low water savers' who did *not* have the low-pressure showerhead were unable to change the showerhead without the express permission of the landlord to whom they were held accountable for any changes to the property.

A female 'moderate water saver' said: "*I don't own the apartment, but if it was mine, I would"*

While a male 'moderate water saver' said:

"I would be willing but as I said I'm a tenant, so it's not my place, so the most I could do is discuss with my landlord saying such things exist and it might be a good idea to put them in."

Another institutional barrier in relation to the use of the heavy weight in the toilet cistern was mentioned by 3 out of the 9 'avid water savers' as they wanted to use this technique to conserve water, but were unable to do so because their toilet cisterns were installed behind the wall and therefore inaccessible. A female 'avid water' said:

"No its [toilet cistern] all in the walls which is unfortunate cause where we have them at work what we've done is put weighted bottles into them."

While a female 'moderate water saver' said:

"There's really not much space. It's really tiny, so the apparatus itself is smack bang in the middle and I really don't think I could maybe put in like small water bottles."

7.7 Discussion Section

The previous section used quotes from respondents in all three water saver categories to illustrate that personal characteristics is the main enabler or the main barrier to water conservation, because it has a ripple effect on how other factors such as Information, Social, Technical, Financial or Institutional affect a respondent's water conservation. That said, while personal characteristics can be attributed to be a 'driver' of other factors, the data analysis has shown that water conservation amongst the 'avid', 'moderate' or 'low' water savers can be attributed to the influence of the six factors.

Table 9 below, summarizes the results presented in Chapter 5, 6 and 7 and serves as a visual overview of how these factors influence water conservation in each of the three water saver categories.

Factor	Water Saver Category	Barrier	Enabler	Neither Barrier nor Enabler
Personal Characteristics (Pro-environment identity, Environmental consciousness, Self-efficacy, Locus of control)	Avid		X	
	Moderate		X	
	Low	X		
Information (Knowledge of the existence of the water crisis, Knowledge about water conservation techniques)	Avid		X	
	Moderate		X	
	Low	X		
Social (Social networks made up of friends, family, colleagues, Cultural norms)	Avid		X	
	Moderate		X	
	Low	X		
Financial	Avid			X

(Financial ability)	Moderate			X
	Low			X
Technological (Technological Capability and 'know-how')	Avid			X
	Moderate			X
	Low			X
Institutional (Structural or Regulatory Factors)	Avid		X	
	Moderate	X		
	Low	X		

Table 9: Barriers and Enablers of Water Conservation in Avid, Moderate and Low Water Savers

Five main observations will structure the discussion of the enablers and barriers amongst the three water user categories.

First, it is striking that personal characteristics, information, and social factors enable the 'avid' and 'moderate' water savers to reduce water usage. The personal characteristics is an enabler to the 'avid water savers' who hold altruistic values to environmental protection, are willing to inconvenience themselves in daily life, and take pride in being 'warriors' for water conservation. Similarly, personal characteristics are an enabling factor among the 'moderate water savers' in the sense of commitment to water conservation though with less passion and less at stake for maintaining an environmentally conscious self-identity. Different from these two water saver categories, the personal characteristics are the dominant barrier among the 'low water savers' who generally have other priorities than water conservation, are unwilling to make themselves uncomfortable in a bid to conserve water, and expect the water authorities to resolve the water crisis. Furthermore, information and social factors function as enablers to the 'avid water savers' and the 'moderate water savers' who are well-informed and continuously look for new information through their social networks, amongst other; though the 'avid water savers' are more active than the 'moderate water savers'. This finding speaks to the idea that 'avid water savers' are altruistic individuals acting in accordance with their activated personal norms (Kollmuss and Agyeman, 2002; Abrahamse and Steg, 2009). The choice of wearing clothes several times before washing and inconveniencing themselves by standing in a bucket during a shower and using that water to flush the toilet is in line with their environmental identities. The close link between sense of responsibility for the environment and water conservation follows the literature on pro-environmental behaviour (Willis et al., 2011; Abrahamse and Steg, 2009); as phrased by Kollmuss and Agyeman (2002) that "people with a greater sense of personal responsibility are more likely to engage in environmentally responsible behaviour" (Kollmuss and Agyeman, 2002 p.243).

Second, while personal and social commitment to water conservation are enablers to both the 'avid water savers' and the 'moderate water savers', *the commitment* is stronger amongst the 'Avid water savers' due

to the identity of being 'Smile Water Warriors'. The 'avid water savers' hold biospheric values and environmental protection as one goal in life and when they act in accordance with their norms, they feel motivated to do more as it strengthens their identity of contributing to a healthy environment for future generations (Bissing-Olson et.al, 2016; Martin & Czellar, 2017). A related point is that for some individuals "social identities predict pro-environmental behaviour, but the strength may depend on whether the behaviour is visible to others" (Brick et.al, 2017). Most of the 'avid water savers' identified as being Smile Water Warriors and being part of neighbourhood water conservation groups, which are a forum for exchange of ideas and experience on water conservation and where people's efforts become visible to others. This visibility – "green to be seen" – act as motivation (Brick et.al, 2017) and reaffirming identity of being altruistic for environmental protection (Abrahamse and Steg, 2009; Martin and Czellar 2017).

Third, the 'avid' and 'moderate' water saver categories differ in relation to institutional factors. The 'avid water savers' are homeowners with ability to install technical solutions and access information on their water use and cost, whereas the 'moderate water savers' are tenants restricted from making structural changes to their living environment and without regular access to their water bills. The place of living as an institutional barrier follows the point that regulations often discourage water conservation (Blumstein et al., 1980 p.3). This is also the case for access to water bills; home owners know their water use and utility cost, whereas tenants do not have access to such information from the landlord. This difference is important for understanding why institutional factors are neither an enabler nor barrier to the 'avid water savers' who are generally home owners but a barrier for the 'moderate water savers' and the 'low water savers' who are generally tenants. The finding speaks to Kollmuss and Agyeman's (2002) argument that individuals mostly adapt to pro-environmental behavior when the necessary infrastructure is provided.

Fourth, technological and financial factors did not appear to be neither an obstacle nor a driver of water conservation amongst the 'avid' and the 'moderate' water users, because their water conservation was based almost entirely on their behaviour. For example, only few 'avid' water users used the technological provision of a low-pressure showerhead, instead they manually reduced the water that comes out of the showerhead. The finding that these two factors are neither obstacle nor driver of the pro-environment behaviour for the most committed water savers, is surprising considering that the technical solutions are generally cheap and require little know-how.

Fifth, and finally, for the 'low water savers' all the six factors presented barriers to varying degrees. The dominant enabler was the personal characteristic, which has a bearing on all the other factors – limited interest in getting information on water saving techniques and availability of low-cost technical solutions,

low inspiration from social relations, and giving priority to cultural values, for example, hygiene concerns. In addition, the 'low water savers' are generally tenants facing institutional barriers for adopting simple technical devices that would enable them to save water without inconveniencing themselves. The unwillingness amongst 'low water savers' to take actions that will reduce water usage corresponds with the position that some individuals adapt pro-environmental behaviour that requires minimum effort, cost or sacrifice to themselves (Dziegielewski, 2003 p.34). Some 'low water users' expressed sentiments reflecting 'tragedy of the commons' that corresponds with the view that people are less likely to save water if they do not trust that the water authority is managing the water crisis well (Jorgensen et al., 2009; Van den Bos et al., 1998; Lee and Warren, 1981). Low trust in the water authority is associated with an external locus of control in the sense that they feel unable to change the situation and blame other actors such as the government water authority (Jorgensen et al., 2009). The low knowledge about water conservation amongst 'low water savers' were partly due to their did not seek information; a point that speaks to the importance of public education on the need to conserve water and tangible conservation practices as an effective approach to reducing water consumption (Dziegielewski, 2003; Remmert 2017). As 7 out of 9 'low water savers' are young males (whereas 7 out of 9 of the 'avid water savers' are middle-aged women) this finding corresponds with the view that women tend to be more emotionally engaged in environmental concerns and willing to adapt to pro-environmental behaviour (Kollmuss and Agyemann, 2002), and more mature people tend to be more likely to save water than younger people (Clark and Finley, 2007; Lyman, 1992).

Chapter 8: Conclusion and Recommendations

8.1 Conclusion

The City of Cape Town experienced a record-breaking drought and a resulting water crisis in 2015-2017 (Matikinca et al., 2020:23). The severe water crisis was attributed to prolonged drought caused by climate change (Wolski, 2017), rapid population growth (Enqvist and Ziervogel., 2019:12), reliance on six rain-fed dams to provide 95% of Cape Town's water supply (Ziervogel, 2019:3) and excessively high water use by formal households (Enqvist and Ziervogel., 2019:5). According to the Department of Water and Sanitation, formal households used approximately 65% of Cape Town's municipal water supply (DWS, 2018:4). The City of Cape Town took various measures to manage both the demand and the supply of water in order to alleviate the stress caused by the water scarcity. To reduce demand, a public education campaign paired with progressively increased water restrictions was implemented. However, despite the growing

water restrictions and the worsening of the water crisis, Capetonians did not reduce their water consumption enough.

This study aimed at gaining an understanding of the barriers and enablers to water conservation amongst these residents in formal residential households in the City of Cape Town. The study explored the residents' perceptions of the water crisis and the perceptions they held of their role in mitigating the water crisis. The study also explored the resident's knowledge on the water crisis and water conservation techniques together with their reported daily water use. Together, this investigation served as a pathway to understanding the barriers and enablers of water conservation amongst formal residential households.

The data analysis led to the identification of three categories of water savers, which involve respectively the highest, the lowest, and the median water savers within the data set.

'Avid water savers' consisted of the 9 respondents with the most comprehensive water conservation practice (equivalent to 52-74% of water conservation). 'Low water savers' consisted of the 9 respondents with the lowest water conservation practice (4-26% of water conservation), whereas the 'Moderate water savers' consisted of 9 respondents with the 'middle' water conservation practice (39-48% of water conservation).

The results show that there is not just one barrier or one enabler to water conservation. That said, personal characteristics such as pro-environment identity combined with high self-efficacy is the most powerful enabler to water conservation because it works as a catalyst to enhance other enabling factors, such as seeking information about the water crisis, and engaging in conversations about water conservation within social networks. Furthermore, the main barrier to water conservation appears to be personal characteristics for people who do not embody a pro-environment identity, and who view water governance institutions with a level of suspicion and mistrust. In other words, this study has shown that the factor of *Personal Characteristics*, serves as the main enabler *and* as the main barrier to water conservation because Personal Characteristics have a ripple effect on how factors such as *Information, Social, Technical, Financial or Institutional* factors affect a respondent's water conservation.

8.2 Study Findings on Objectives and Research Questions

The aim of this study was to gain an understanding of the barriers and enablers to water conservation amongst residents in formal residential households in the City of Cape Town. To fulfil this aim, the study addressed three Objectives, each with its own set of Research Questions.

8.2.1 Objective One

Objective One sought *to understand how Cape Town residents perceive the water crisis and their role in it.* Its corresponding Research Questions were: *a) Are residents aware of the current water crisis? b) How do residents perceive the water crisis?* and *c) What role do residents feel they play in the current water crisis?*

In order to answer this objective, the study inquired about the respondents' perceptions of the water crisis, their water use and their ability to contribute to resolving the water crisis. The results show that that there is a correlation between the knowledge a respondent possessed about the water crisis, about water conservation and their notions of self-efficacy to resolve the crisis.

First, the study showed that all of the respondents were aware of the water crisis and had gained information from the public awareness campaign. The study affirms that public education campaigns through mass media advertising campaigns and promotional campaigns and events can form the basis for increased water conservation.

Second, the study revealed that the levels of knowledge about the water crisis and water conservation techniques varied among the three water saver categories. The 'avid water savers' possessed the most knowledge, followed by the 'moderate water savers', and then the 'low water savers' with least knowledge. The results showed that the 'avid water savers consume and acquired a lot of information through various channels and engaged in conversations about the water crisis and techniques within their social networks, whereas the 'moderate water savers' only did so at times and the 'low water savers' rarely did so.

Third, the results show that access to monthly water bills may enhance water conservation. Most of the 'avid water savers' had access to their water bills and used them as a source of inspiration for their water use. 'Moderate water savers' and 'low water savers' were mostly tenants without access to their water bill, and did not have the opportunity to accurately gauge their water consumption. Thus, lack of information about one's water consumption may discourage water conservation.

Fourth, the study revealed that 'avid water savers' reported feeling personally responsible for alleviating the water crisis and reported being environmentally conscious. 'Moderate water savers' also reported caring about the water crisis, albeit to a much lesser extent than the 'avid water savers', yet much more than the 'low water savers'.

Finally, the 'avid water savers' believe that their water conservation contributes to mitigation of the water crisis. A high sense of self-efficacy and passion amongst the 'avid water savers' for water conservation appears to go hand in hand. At the other end of the spectrum, most 'low water savers' emphasized that the government was responsible for the water crisis and for resolving it; they do not personally feel responsible for alleviating the water crisis.

8.2.2 Objective Two

Objective 2 sought '*To determine how Cape Town residents are responding to the water crisis in Cape Town.'* Its corresponding Research Questions were a*) Are residents aware of how many litres of water they use daily?* and *b) What water conservation behaviours and techniques are currently being employed by residents in Cape Town?*

The study revealed that the most common and extensive water conservation behaviour was in relation to showering, toilet flushing and dishwashing. The City of Cape Town's public water conservation campaign emphasized water conservation in these areas of everyday life, hence we may greatly attribute the campaign to this behaviour change.

The study also showed that the respondents engaged more in water conservation behaviour than adoption of technical solutions. This was an unexpected finding, as it was assumed that the adoption of technical devices - such as the low-flow showerhead and the heavy weights placed inside the toilet cistern - would be easily adopted as they are a 'one-time fix', relatively inexpensive, readily available and easy to install with low demands on technological know-how, whereas water conservation through behaviour must be done repeatedly and consistently. This finding tells us that it is still easier to adopt behaviour change that do not require special skills or resources than acquiring new technology.

8.2.3 Objective Three

Objective 3 sought to '*Identify the Barriers and Enablers of water conservation for residents in formal residential households in Cape Town.'* Its corresponding Research Questions were *a) What do formal residents report as barriers to their conservation of water?* and b*) What do formal residents report as enablers to their conservation of water?*

As mentioned above, the study has revealed that there is not one barrier or one enabler to water conservation. Rather, the study has shown that the factor of *Personal Characteristics*, serves as the main enabler and the main barrier to water conservation, as Personal Characteristics influence other factors

such as *Information, Social, Technical, Financial or Institutional,* which ultimately shape a respondent's water conservation.

The overriding enabling factor for the 'avid water savers' was that they had a pro-environment identity hence water conservation is tied to their identity. Also, the 'avid water savers' tended to hold altruistic views about the environment and would act in a way that promotes other people's welfare or wellbeing.

The 'avid water savers' outlook on the water crisis can be viewed as a blueprint on how to think about the water crisis and act in order to solve the crisis. The personal characteristics of pro-environment identity foster a sense of ownership to solve the water crisis making water conservation a deeply personal task. The 'avid water savers' hold a strong sense of self-efficacy and believe that their water conservation contributes to mitigation of the water crisis. The study can thus conclude that a pro-environment identity combined with high self-efficacy is the most powerful enabler to water conservation within this data set. This enabling factor works as a catalyst to enhance other enabling factors, such as seeking information and engaging in conversations about water conservation within their social networks. Furthermore, the pro-environment identity and sense of self-efficacy reduce barriers such as the discomfort of taking short showers, standing inside a bucket during a shower and collecting greywater for re-use from being viewed as arduous tasks to necessary actions that align with their personal identities. Hence, they are willing to inconvenience themselves to conserve water as part of broader environment protection.

Conversely, personal characteristics presented itself as the key barrier to water conservation among the 'low water savers'. The analysis showed that 'low water savers' were aware of the water crisis, but did not seek information about ways to conserve water hence they lacked tangible information to make effectual changes. The 'low water savers' showed unwillingness to take actions that interfered with their lifestyle and were more likely to fall victim to the 'tragedy of the commons' where self-interest outweighs the need to act for the good of society. It somehow follows that this group of respondents held negative views on other people's water use and against the water governance authorities, whilst lower sense of self-efficacy in relation to solving the water crisis further discouraged them from water conservation.

Similarly to the 'avid water savers', personal characteristics are an enabling factor among the 'moderate water savers' in the sense of commitment to water conservation though with less passion and less at stake for maintaining an environmentally conscious self-identity.

Information and social factors function as enablers to the 'avid water savers' and the 'moderate water savers' who are well-informed and continuously look for new information through their social networks,

amongst other; though the 'avid water savers' are more active than the 'moderate water savers'. For these two water savers categories, technical and financial factors are neither barriers nor enablers as the technical solutions are generally cheap and require little know-how. However, the two water saver categories differ in relation to institutional factors as the 'avid water savers' are homeowners with ability to install technical solutions and access information on their water use and cost, whereas the 'moderate water savers' are tenants restricted from making structural changes to their living environment and without regular access to their water bills.

For the 'low water savers' all the six factors presented barriers to varying degrees. While the dominant enabler was the personal characteristic, as mentioned above, it has a bearing on all the other factors – limited interest in getting information on water saving techniques and availability of low-cost technical solutions, low inspiration from social relations, and giving priority to cultural values, for example, hygiene concerns. In addition, the 'low water savers' are generally tenants facing institutional barriers for adopting simple technical devices that would enable them to save water without inconveniencing themselves.

8.3 Recommendations

8.3.1 Future Public Education and Awareness Campaigns

8.3.1.1 Fostering pro-environment identity amongst urban residents

The study has shown that the overriding enabler to water conservation is having a pro-environment identity. The City of Cape Town could grow this broad pro-environment identity by making it a 'trade mark' – or identity of the city itself and put into practice through school curriculums that grow a consistent environmental conscious outlook more accessible, inclusive and mainstream, and where care of the environment is part and parcel of everyday life through water conservation as well as through recycling, generating less waste, living sustainably and eating locally.

8.3.1.2 Enhance Participation and Trust in Water Governance

The study showed that the way in which residents of a city perceive a crisis and the role of the government in that crisis has a bearing on their water conservation actions. Future public awareness campaigns about a water crisis should inform residents about the severity of the crisis and the role of the residents' water use in contributing to resolving the crisis. Enabling residents to have a perception of high self-efficacy in their water conservation actions may encourage ownership and water conservation.

8.3.1.3 Educate on water conservation techniques

The study showed that the general public had easy access to information about the crisis but *not* to information on how to mitigate the water crisis. The critique was that the *how* to conserve water was not part of the public signage; not visible and simple enough for someone passing a sign to quickly grasp the information. Instead, in order to learn how to conserve water the residents had to tune into radio stations with programmes on water conservation or look for social media videos or articles on how to conserve water. Future campaigns should provide information on how to do water conservation in the form of infographic posters placed throughout the city on lampposts, buses, backpacker's lodges, restaurants and malls, public restrooms and public areas.

8.3.1.4 Help Residents to Quantify Water Use More Easily

The City of Cape Town developed the online Think Water Calculator as an attractive and innovative way to monitor water use. However, the study showed that most respondents did not know how to quantify their water use and this substantially reduced the efficiency of the government's clear message to use maximum 87 litres of water per person per day. Furthermore, the use of the calculator relies on the assumption that residents are aware of the calculator, that they will use it and to the extent that the city has envisioned, which was to make a noticeable reduction in water use. This seems to be too many variables to fathom.

Instead, the government should provide a water meter to each household – similar to an electricity meter - to measure usage on a daily, weekly, or monthly basis. Giving residents the opportunity to monitor their water consumption would enhance understanding of their own water consumption and may enhance efforts of water conservation.

8.3.2 Recommendations for Policy

8.3.2.1 Implement laws that require water bills to be paid by tenants

The study showed that the responsibility of paying monthly water bills in residential premises rests with the landlords leaving the tenants without knowledge on their own water consumption and without financial incentive to reduce water use. This is fundamentally different from the way electricity bills are handled by tenants and landlords. Tenants receive electricity bills directly and make monthly payment; they know how much electricity they consumed and they benefit financially from lower consumption. It is recommended that the city and the landlords use same method in relation to the monthly water bill.

8.3.2.2 Mandatory installation of low flow showerheads in formal dwellings

Low flow showerheads lead to lower water use without more input from the individual than the initial small investment and installation of the water efficient device, but most respondents did not have such a

technical device. It should be mandatory installation in houses, apartments, backpacker's lodges, and university residences; and hotels that use luxurious shower settings should be required to pay an extra levy in addition to paying for the large volumes of water.

8.3.3 Recommendations for Further Research

Further research should be carried out on the most effective ways to make climate change and environmental consciousness part of the mind-set of people in formal residential dwellings as well as broadening the scope to the common man in Cape Town. Climate change communication should deliver key messages that are readily absorbed by the target audience, yet further research on which climate change communication would push climate change mitigation into the general consciousness of the residents of the City of Cape Town, both in its own right and in relation to the supply and availability of water, is required.

Linked to this, would be the opportunity to carry out research on how to make pro-environment, and specifically water conscious, behaviour mainstream and 'cool'. In line with this, conducting further research on the best ways to make water conservation actions socially applauded and turn ordinary residents into 'environmental ambassadors' may have the effect of encouraging other ordinary residents to adopt such an identity.

Finally, it would also be important and interesting to reflect on the study findings by looking at the unspoken implications of the study. For instance, is the behaviour change that was exhibited during the 2015-2017 crisis behaviour change that continues to be exhibited by individuals once the crisis has passed? It could also be interesting in future research to examine whether avid and low water savers have anything in common or are they complete opposite in every regard?

Chapter 9: References

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10: Annexes

10.1 Interview Consent Form

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Project Title: Barriers and Enablers to Water Conservation in Formal Residential Households in Cape Town

Invitation to participate, and benefits: You are invited to participate in a research study conducted with formal residential households in the City of Cape Town, South Africa. The study aim is to identify the barriers and enablers to water conservation in the formal residential households in Cape Town. This study will investigate water use in formal residential households in Cape Town, specifically whether formal residential households are aware of how many litres of water they use daily and monthly, and to determine what water saving techniques are currently being employed by formal residential households. I believe that your experience would be a valuable source of information, and hope that by participating you may gain useful knowledge.

Procedures: During this study, you will be asked to answer questions regarding individual and household water consumption within your formal residential household. This will be done through semi-structured interviews.

Risks: There are no potentially harmful risks related to your participation in this study.

Disclaimer/Withdrawal: Your participation is completely voluntary; you may refuse to participate, and you may withdraw at any time without having to state a reason and without any prejudice or penalty against you. Should you choose to withdraw, the researcher commits not to use any of the information you have provided without your signed consent. Note that the researcher may also withdraw you from the study at any time.

Confidentiality: I will record the interviews by hand and a recording device and then transcribe them and by signing the Consent Form you will be giving me permission to do the same. All information collected in this study will be kept private in that you will not be identified by name or by affiliation to an institution. Confidentiality and anonymity will be maintained as pseudonyms will be used.

What signing this form means:

By signing this consent form, you agree to participate in this research study. The aim, procedures to be used, as well as the potential risks and benefits of your participation have been explained verbally to you in detail, using this form. Refusal to participate in or withdrawal from this study at any time will have no effect on you in any way. You are free to contact me, to ask questions or request further information, at any time during this research.

I agree to participate in this research (tick one box)

☐ Yes ☐ No _____ (Initials)

_____	_____	_____
Name of Participant	Signature of Participant	Date

_____	_____	_____
Name of Researcher	Signature of Researcher	Date

10.2 Interview Guide

1. What part of Cape Town do you live in?
2. Stand Alone House or Apartment?
3. Are you a Homeowner or Tenant?
4. Municipality water or borehole water?
5. Are you aware of the drought the City of Cape Town and the Western Cape are currently facing?
6. Which of the following statements do you most identify with?

I don't care about saving water	I care a little about saving water	I am passionate about saving water

7. Which of the following statements do you most identify with, with regard to water conservation?

I don't think I can make a difference	I don't know/ I'm indifferent	I think I can make a difference

8. Which of the following statements do you most identify with?

I do not know anything about water saving techniques	I know a little about water saving techniques	I know a lot about water saving techniques

9. Which of the following statements do you most identify with?

I think we are going to run out of water in Cape Town	Interrupted.	I think water will carry on being supplied in Cape Town	I don't know

10. What have you heard from mainstream media (TV/Newspaper/Radio/Online News) about the water crisis?
11. How does information in the media (TV/newspaper/radio/Online News) influence your water use behaviour?
12. What have you heard from social media (Facebook/Twitter/Instagram etc) about the water crisis?
13. How does information in social media (Facebook/Twitter/Instagram etc) influence your water use behaviour?
14. Are there any groups of people that influence your behaviour? Friends, community, church, colleagues, family.
15. Have you changed your water consumption since the water crisis in Cape Town began?
16. How has your water consumption changed?

17. What do you think about the way the City of Cape Town has been communicating to the public about the water crisis?
18. What percentage of Cape Town's municipal water supply do you think formal residential households use?

30% to 39%	40% to 49%	50% to 59%	60% to 69%	70% to 79%

19. Do you know how many litres of water we are meant to be using under current water restrictions?
20. Do you know how much water you use a day?

Less than 60 Litres a day	Less than 87 Litres a day	90 -110 Litres a day	More than 120 Litres a day

How have you calculated this amount?

If you do not, do you know how to find out how much water you are consuming per day?

21. What is overuse of water? How do you know if you are overusing?
22. Calculation of daily water usage using the City of Cape Town's "Think Water Calculator" as a guide

Water use focus area	choices				
shower	2 mins (20 litres)	4 mins (40 litres)	6 mins (60 litres)	8 mins (80 litres)	10 mins (100 litres)
How do you wash yourself? I.e. Routine. Shower turned off while shampooing etc.… Ask: Bucket in shower to catch water before and during shower? Where is this water reused? Reduced frequency of showering?					
Have you invested in low pressure showerheads?	Yes Specify: Is this is for all showerheads in the house, or just some? Reasons?		No Please give reasons why not		

Do you bath instead of showering?	Yes Specify how many times a week		No Please give reasons why not	
Toilet	1 flush (9 litres)	2 flushes (18 litres)	3 flushes (27 litres)	More than 3 flushes Specify how many
After you have used the toilet, how do you decide whether you will flush the toilet or not. Ask if: Reduced frequency of toilet flushing?				
What water do you use to flush the toilet?	Potable municipality water		Greywater	
Dishes (if using sinks) Ask: Routine when washing dishes? Running water while washing or accumulated in plugged sink? Does the water go down the drain or do they use it elsewhere?	1 sink (9 litres)	2 sinks (18 litres)	3 sinks (27 litres)	more than 3 sinks Specify
(if using a dishwasher) Do you use a dishwasher to wash your dishes and utensils?	Yes (31 litres per wash) Specify how many times per week the dishwasher is run? Specify if they are full loads or not		No Please give reasons why not	
Laundry Do you use a washing machine to wash your clothes? Clarify if: Full loads only? Reduced loads of linens, towels etc? Eco-friendly/quick wash washing machine settings?	Yes (70 litres per wash) Specify how many times per week the washing machine is run?		No Please give reasons why not	

Catch and reuse washing machine runoff?				
Daily hygiene (hands and face)	1 wash (3 litres)	2 washes (6 litres)	3 washes (9 litres)	more than 3 washes Specify how many washes.
Do you use a cup instead of letting the tap run when shaving/ washing your face?	Yes Please give reasons why not		No Please give reasons why not	
Brushing teeth	once (0.15 litres)	twice (0.3 litres)	Thrice (or more) (0.45 litres) Specify how many	
Do you use a cup instead of letting the tap run when brushing your teeth?	Yes Please give reasons why		No Please give reasons why not	
Cooking	1 meal (0.60 litres)	2 meals (1.20 litres)	3 meals (1.80 litres)	
drinking	1 glass (0.25 litres)	2 glasses (0.50 litres)	3 glasses (0.75 litres)	more than 3 glasses specify how many
pets (per bowl)	Small (1 litre)	Medium (2 litres)	Llarge (3 litres)	
Do you water your garden?	Yes Specify: Type of water Volume of water used/how many minutes the water runs for		No Please give reasons why not	
Do you have a swimming pool or water feature? Ask: do you top up your pool. If yes, what water do you use if you top up Pool cover?	Yes Specify: Volume of pool Frequency of water change per month		No Please give reasons why not	

23. Can you tell me about the reasons that have driven you to save water? What are your motives?
24. What do you think you could do to use less water? Do you think you will implement these water saving measures? Why?/Why not?
25. If you do not save water, can you tell me the reasons you do not save water OR. Can you tell me if there are any reasons you are unable to save water.

26. In the event that you use excess water, are there any justifications you have made for this?

27. The City of Cape Town has a list of water saving techniques that households can use to conserve water.

Technique	Are you already aware of this technique being used to save water? Do you know how this technique works?	Do you currently use this technique? Please tell me why you are already using this technique.	If you do not currently use this technique, can you give me the reasons you are not using this water saving technique	What are the reasons you WOULD begin to use this technique?	What are the reasons you WOULD NOT begin to use this technique?
Rainwater Tank OR buckets that catch rainwater?					
Rainwater harvesting from gutters?					
Low Pressure Shower Head					
Brick/heavy weight in toilet cistern					
Use of greywater to flush toilets					
Use of greywater to water garden					

<u>Questions to ask regarding Barriers on why they aren't already using this water saving technique and WHAT are the reasons they would not start using this technique</u>

(Informational Barrier)

a) Has it been because you were not aware of this technique to save water?

You don't know about it (info)

(Technological Barrier)

b) Is there a technological barrier that has prevented you from using this water saving technique?

You don't know how to do it (tech)

You don't know where to get it

(Financial Barrier)

c) Are there any financial barriers that have prevented you from using this water saving technique?

Is the reason because you don't want to spend money on it or are unable to spend money on it

(Social Barrier)

d) Do cultural norms and values, or any other social factors dictate whether you are able to use this technique?

You don't see others doing it

Friends/ family/ neighbours' don't do it

There is no pressure from friends or family to do it

You don't think it is important

It's not a priority

(Institutional Barrier)

e) Are there formal rules and processes which prevent you from using this water saving technique? Eg: Landlords rules

(Time Barrier)

f) Is it because time is a barrier

You don't have time to do it (time)

You don't get around to it

28. Are there any other water saving techniques you use, in addition to the ones we have discussed above?
29. (Restriction) What effect would rationing of water/water shedding have on your water use habits?
30. (Neighbours') If you were made aware of the average amount of water consumed by your neighbours', how would this change the amount of water you consume?
31. (Persuasion) What has persuaded you to change your water consumption?
32. What more could be done to persuade you to change your water use consumption?

33. (Skills/Capability?) Do you think conserving water is a skill? Please elaborate.
34. What would make you more capable of conserving water?
35. What could have been done to prompt you to reduce your water consumption?
36. In your opinion, why do you think some people do not conserve water or have not changed their water consumption behaviour?
37. (Environment) Is there anything in your physical and living environment that prevents you from conserving water and abiding by the current water restrictions?
38. (Education) What is your opinion on the education and awareness the public and school children have received on the water crisis and water saving techniques. Please elaborate, on what you would change, if anything.
39. Do you think behaviour change is a way to alleviate the water crisis in Cape Town?
40. In your opinion, what do *you* think could be done in order to curb water consumption in the City of Cape Town?
41. Have you checked your residential premises and your pipes for any leaks?
42. If you were fined or charged more for excessive water consumption, would that prompt you to conserve more water?
43. Could you be incentivized to use less water? How?
44. What is your opinion on the education and awareness the public and school children have received on the water crisis and water saving techniques. Please elaborate, on what you would change, if anything.
45. Would you be willing to share your household water bill with me for the last 6 to 12 months?
46. Would you be willing to show me the water saving measures you have employed in your house either in person or through photographs?
47. Would you be willing to keep a water use journal illustrating your water consumption for the next 7 days?

10.3 Overview of the Data Coding System

Focus Area (Total Points per Focus Area)	Water Conservation Behaviour (Number of Points)		Technical Solutions (Number of Points)
Shower (4 points)	vi. Choose showers instead of baths vii. Reduce shower frequency viii. Reduce shower duration ix. Start-Stop washing x. Collect greywater using basis for re-use	0 actions (0) 1 actions (1) 2 or 3 actions (2) 4 or 5 actions (3) **Max Points: 3**	Easy DIY Technical Solution: Low flow showerhead (1) **Max Points: 1**
Dishes (2 points)	<u>If using sinks</u> iii. Start-Stop washing/plugged sinks + let water go down drain (1) OR iv. Start-Stop washing/plugged sinks + collect and re-use dirty water (2) <u>If using Dishwasher</u> iv. Reduced frequency of loads (1) v. And/Or vi. Use eco-friendly/quick wash settings (1) **Max Points: 2**		No Technical Solution
Toilet (5 Points)	iii. Reduced flush frequency per day (1) And/Or iv. Use of grey-water to flush toilet (2) **Max Points: 3**		Easy DIY Technical Solution: iii. Weight in cistern (1) OR Expensive Technical Solution: iv. Water efficient toilet (2) **Max Points: 2**
Daily Hygiene (2 Points)	iii. Start-Stop washing/use a cup + let water go down drain (1) OR iv. Start-Stop washing/plugged sinks + collect and re-use dirty water (2) **Max Points: 2**		No Technical Solution
Tooth Brushing (2 Points)	iii. Start-Stop washing/use a cup + let water go down drain (1) OR iv. Start-Stop washing/use a cup + collect and re-use dirty water (2) **Max Points: 2**		No Technical Solution
Laundry (4)	iii. Reduced frequency of loads (1) And/Or iv. Use eco-friendly/quick wash settings (1) **Max Points: 2**		Easy DIY Technical Solution: iii. Re-routing water from washing machine into plastic basins (1) Or Expensive Complex Technical Solution: iv. Water Efficient Washing Machine (2) **Max Points: 2**
Cooking (2 Points)	III. Reduced water during cooking (1) AND/OR IV. Re-use of water during cooking or other household use (1) **Max Points: 2**		No Technical Solution

Drinking (2 Points)	iii. Collect drinking water from natural springs (1) And/Or iv. Buy drinking water (1) **Max Points: 2**		No Technical Solution
Maximum points achievable per respondent	18		5

10.4 Factors functioning as Barriers and Enablers to Water Conservation - Illustrative Quotes

Factor	Barrier/Enabler	Illustrative Quote
Information	Barrier	*"And even the government itself is not doing much to bring this awareness" - Female, 'low water saver, 21.11.2017*
	Barrier	*"Don't just give us messages saying save water, but how? As you were saying yesterday, when you flush you use a certain amount of water. People don't know that. That's why every time they go pee a person is just out here flushing" - Female, 'low water saver, 21.11.2017*
	Barrier	*"If there would be much more of an awareness like that, I am sure that everyone or me as well, would do my best to try and save water."*
Personal Characteristics	*Enabler (altruism)*	*When we shower, we do that by standing in that big tub, saving water. We do that for some time, and then we use that in the toilet. Sometimes we don't feel like stepping in it, but we do it. – Female, 'avid water saver' – 10.11.2017*
	Enabler (altruism, biospheric intent)	*I was deliberating and in fact my current bathroom has a plug you can put in. It's a shower over a sort of bath so actually you can use all that water, and so if I have a bath I just leave the water in it and use buckets of it to flush toilets, so toilets really get flushed with this water. – Female, 'avid water saver, 06.11.2017*
	Enabler (altruism, biospheric intent)	*"I think that if everyone thinks that and everyone changes their habits dramatically. For example if we all say we can save half our water then half the water is saved for residential not commercial if no one cares then we'd be screwed" – Female, 'avid water saver' – 13.11.2017*
	Barrier	*I think it could also be that life happens so much that you just forget about it. I would want to show more initiative when there's really not much water available. But I think it's because the day-to-day things take up so much of my time that I don't really necessarily focus on it." – Female, 'low water saver'*
	Barrier	*"Showers my duration is the same. I don't take more than a 10 minute shower. 10 minutes to be on average. I don't take long showers. I think a 2 minute shower is the recommended timing. I think that is fairly short." – Male, 'low water saver' – 16.11.2017*
	Barrier	*"It [shower water] actually goes down the drain because I say to myself if I stand with a bucket what am I going to do with this water? I can't see myself filling up my toilet with this water that I have collected." – Male, low water saver, 30.11.2017*

	Barrier	
		I'm not doing anything about it but you see, do I know that I can make a difference? I don't, I'm not saving. I'm not doing anything about it because I feel like my efforts won't make a difference. I know I know my efforts will, but I still don't do anything" - Male, low water saver, 30.11.2017
	Barrier	*"There are all these platforms available...but why aren't you really saving water? It could be like a spoiled thing, because as humans we really are very spoiled. I think as humans we have this tendency of wanting to act last minute. So when we realize the water situation is going to s%*#, we want to actually act on it. But while it's still awareness, we're still very very chilled about it until you can only have a bottle of water for the day." - Female, low water saver - 21.11.2017*
	Barrier	
Social	*Enabler (perception)*	*"I don't think we'd be that influenced by what our neighbours are doing, we just need to be more disciplined with our water usage. So as long as everyone's doing their very best and constantly thinking "how can I use less" or "how can I be more efficient?" then that's the best way*
	Barrier (perception)	*"So I don't know if it's just a hoax that is just there to curb it. Because I don't know if they giving us the full information"*
	Barrier (perception)	*"I feel like I'm not the problem in terms of the consuming of water. I think the problem is the industries like hotels, carwash people, and public facilities- where there's a continuous usage of water- as opposed to domestic use. Commercial use of water takes a lot of water, you can't control the people using it, so that's the space which needs a lot of control".*
	Barrier (perception)	*"I'm aware of the crisis, the water levels, but the thing which makes me also feel less obligated to listen to the city council is that there's also reports going around that they knew about this crisis almost 2, years ago, 2-3 years ago, but they did nothing about it, and now they're coming to us and telling us that "hey, you guys need to stop taking showers, take showers for 2 minutes to conserve water", and I'm thinking "why are you guys stressing us out and you guys knew about this years ago?" It's their fault! I feel like they have a large part to play. They should have done this 2 years ago, not now. Like you can't just come and tell us it's an emergency, stop using water" – Male, 'low water saver' – 28.11.2017*
		" I guess for me I just don't think that my usage is significant enough to cause the shortage to decrease at a certain rate" – Male, 'low water saver' – 28.11.2017
		"I just continue with my normal use. I have not actively taken steps to do anything consciously. For me, it's more of, I'm just continuing with my normal water usage" – Male, 'low water saver' – 16.11.2017

		if I'm coming from the gym and I'm going to take a shower, I'm not thinking about saving water because I'm tired, my mind is stressed out, I just want to take a shower and go away. – Male, 'low water saver' – 28.11.2017
		"I don't actively talk about conservation of water. It may come up, I think the only time it comes up is when we see an advert or a poster. It comes up as a passing conversation, it wasn't a discussion on how to save water, it was more of 'oh yeah there's a crisis, it's bad, what are people doing about it?' and then it ends. – Female, 'low water saver' – 21.11.2017
Technological		*Yes, I have a low pressure showerhead. The water pressure is one of the things that I had said when I did the spec to the architect for the new bathrooms "do something about my water pressure" [and make it lower] – Female, 'avid water saver' – 06.11.2017*
Financial	*Enabler*	*"Well I haven't thought about doing it so far, I don't know how much they would be, but I don't expect it to be as expensive because it's just a showerhead. That I'm totally up for, I guess I've never really thought of showerheads as a way of saving" – Male 'low water saver' – 28.11.2017*
Institutional	*Enabler (regulatory)*	*Yes I have a low pressure showerhead. We were all required to put low pressure shower heads. It was a requirement of the body corporate for the estate" – Female, 'avid water saver' – 28.11.2017*
	Barrier (regulatory)	*"Investing in low pressure shower heads…Unfortunately this lies under the responsibility of our landlord, and they have not yet taken that responsibility" – Male, 'moderate water saver' – 04.11.2017*