

TOWARDS UPTAKE AND APPLICATION OF BEHAVIOURAL NUDGES AND OTHER BEHAVIOUR CHANGE INTERVENTIONS PROPOSED STRATEGIES AND ACTIONS

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**WATER
RESEARCH
COMMISSION**

TT 962/1/25



Towards Uptake and Application of Behavioural Nudges and Other Behaviour Change Interventions Proposed Strategies and Actions

Report to the
Water Research Commission

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WRC Report No. TT 962/1/25

ISBN 978-0-6392-0709-4

May 2025



Obtainable from

Water Research Commission
Private Bag X03 GEZINA,
0031
download from www.wrc.org.za

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EXECUTIVE SUMMARY

Introduction

Setting the Scene

South Africa is a water scarce country, which remains a challenge for government as population and economic growth continues in the face of increasing threats from climate change, water pollution and unsustainable use of the resource. The National Water and Sanitation Master Plan (NWSMP) (2018) estimates that municipalities are losing as much as 1660 million m³ of water per year through non-revenue water (NRW), which increased from 37% in 2014 to 47% in 2023. Despite these constraints South Africans still consume on average 233 litres per person per day, which is approximately 64 litres more per day per person than the average global daily consumption of 173 litres per person per day (Bhagwan, 2024; DWS, 20182). In this context, it is imperative to consider different and innovative ways to decrease water demand and increase water conservation. Should proactive and innovative strategies and interventions not be implemented when trying to conserve water resources and decrease water consumption and demand, the country could experience low agricultural outputs, increase water prices as well as increases in poverty and inequality between water consumers. There is growing consensus that reduction in water use driven by investments in water efficient appliances and technologies is not as effective if not supported by change of individual habits and water consumption patterns.

Purpose of the Research

The objective of the research was to provide a framework for a strategy that introduces behavioural change, including nudges, as a social change intervention available to municipalities to influence water usage behaviour to ensure the long-term sustainability and security of water resources in South Africa.

Approach to the Research

Primary and secondary data were used to inform the framework for the strategy. The secondary data included project information where behavioural nudges and other behavioural change interventions, implemented by municipalities, were reviewed. Grey and published literature was reviewed, including academic articles and research reports published on similar programmes and initiatives conducted internationally and locally. Officials from the water and sanitation departments from the City of Cape Town, City of Tshwane, eThekweni Municipality,

Nelson Mandela Bay Municipality, Rustenburg Municipality and Ugu District Municipality were interviewed. The interviews were guided by a standardised questionnaire.

Limitations to the Research

Many of the interventions implemented by municipalities and government departments did not have any meaningful monitoring data to assess the change in behaviour, hence the research relied heavily on the perceptions of the participants. In addition, the design of the behavioural change interventions were not documented, therefore vital information, such as business plans, project rationale and the design of the intervention were unavailable for review. It was difficult to ascertain impact of the intervention.

Why the Need for a Strategy

As the country enters a complex hydro-extreme environment, water usage behaviour must be influenced for long-term sustainability and water security. Typical water conservation and water demand management (WC/WDM) interventions, such as restriction policies and price mechanisms are no longer working. Driving efficient use and management is the key to future water security. A national strategy that introduces behavioural interventions as a tool for water use management and infuses the uptake and application of such behavioural interventions is necessary. The strategy will also provide a standardised and monitored approach for the effective reduction of water consumption and demand.

Literature Review

Behavioural change interventions, including nudges, is best placed within WC/WDM strategies in South Africa. However, the literature supports the theory that conventional technical solutions to WC/WDM will have limited impact if not enhanced with social change interventions. Despite the overwhelming evidence that behavioural change, including nudges, are effective at influencing behaviour, the use of such interventions for water conservation purposes remains largely unexplored. Behavioural nudges are inexpensive, scalable and non-punitive methods of subtly encouraging the way people behave and consume water resources, and should therefore be considered as a key intervention tool within municipalities to be used to reduce water consumption. Behaviour change interventions, especially nudges, that subtly guide people's choices without restricting their freedom of choice or without coercive force have been found to have the greatest impact. Behaviour change interventions can be influenced by several variables, including the characteristics of the target population, the context and setting of the intervention, the design and delivery of the intervention, and the evaluation and feedback of the intervention. These factors impact the effectiveness,

acceptability, feasibility, and sustainability of behaviour change interventions. Therefore, it is important to take these variables into consideration when planning, implementing, and evaluating behaviour change interventions.

The literature illustrates that enhancing water conservation behaviour through behaviour change interventions can be effective and is done by targeting the different mechanisms and 'ingredients' that make up the decision-making processes, whether reflective, semi-reflective or automatic. However, interventions are often limited in scale, short-lived and do not have a lasting impact. Uptake of water conservation behaviour interventions in South Africa has been poor, despite the large number of successful pilot interventions. Upscaling is needed to translate research findings into sustainable impact. Scaling up includes the expanding, adapting, and sustaining of policies, programmes and projects in different places at the same time, to reach a greater number of people, in a quicker and more equitable way, lasting effects (Westermann et al., 2015). This section will elaborate on the strategies and mechanisms used to upscale public health interventions, agricultural programmes, poverty reduction programmes and climate change mitigation interventions.

Building Blocks of a Successful Behavioural Change Strategy

Before a municipality or any implementing agent can devise a plan to use non punitive measures to reduce water consumption, it is imperative to have a strategy in place to ensure the sustainability of the intervention. The Deming Model of Plan, Do, Check and Act is an excellent tool to guide the development of the behavioural change strategy. The model is systematic and iterative, resulting in structured continuous learning and improvement of the overall intervention. The approach allows the intervention to adapt based on evidence.

Legislation in Support of a Behavioural Change Strategy

WC/WDM is sufficiently addressed in South African law, meaning that behavioural change interventions are supported within the existing policy and legal framework in the country. Municipalities have a clear mandate to protect and conserve water and to undertake and promote WC/WDM activities. However, while many of these legislations, policies and strategies outline specific objectives and targets as to going about conserving and managing water resources there is a lack of in-depth information and targets on how to go about achieving as well as funding these initiatives. Further to this, there is little to no guidance on how to incorporate behavioural interventions into the current legal framework, suggesting that the Strategy to Infuse the Uptake and Application of Behavioural Nudges is necessary to fill the current gap in the policy landscape.

Key Roleplayers Necessary for the Operationalisation of the Strategy

The Department of Water and Sanitation, catchment management agencies, water service authorities, water service providers, communities and funders are all key water sector roleplayers that are instrumental in the uptake and application of behavioural nudges and associated behaviour change interventions. The stakeholders are critical to the success of the intervention. It is vital to understand their roles, what their input should be and how to gain their trust and buy-in when developing the behavioural change strategy. While many government departments are not directly involved and active in the water sector, they need water to realise their visions, mandates and commitments. Their buy-in is essential in raising awareness of any behavioural change interventions. Research institutes and universities inform the foundation of our knowledge base across various fields and topics and drive innovation, knowledge sharing, advocacy and awareness. Specifically, within the water sector of South Africa, they play a key role in the collection of data and information and, in many cases, this information and research informs policy development and assists in the development of new technologies. To realise the benefits of behavioural change interventions in curtailing water use and demand it is essential for stakeholders to collaborate in a meaningful way to ensure integrated solutions, co-funding collaboration, conflict resolution, knowledge sharing, policy development and extending the reach of the intervention.

Planning and Implementation Framework

Upscaling behavioural nudges and other behavioural interventions in the context of WC/WDM requires a structured approach to ensure that the intervention remains effective across a larger population and throughout diverse settings. Careful planning is therefore essential to improve the uptake and national scaling of behaviour change interventions. The WC/WDM Strategy is the overarching guide for managing water use and demand. In the absence of a WC/WDM Strategy, municipalities can reduce water losses and increase water security through the Water Services Development Plan (WSDP). Another planning document closely aligned with the WSDP is the Integrated Development Plan (IDP), which ensures that water service planning is executed in a structured manner based on information and knowledge. Therefore by incorporating behavioural nudges and other change interventions targets into the IDP targets, municipalities are accountable for planning and developing appropriate measures and allocating resources to support these interventions. To improve accountability and to ensure the implementation, behavioural change targets could be included in the Annual Performance

Plans of managers although this approach may be considered punitive and may not always have the desired outcome if there is no buy-in from the individuals involved.

The implementation plan for any behavioural change strategy must outline the scope in terms of the problem statement, the target group and desired change. Thereafter, the context of the change must be scrutinised based on accurate and relevant information. It is only then, that the change intervention can be designed. Once the intervention is implemented according to the design, monitoring data must be analysed against the intended objectives to determine if corrective actions are required, if the intervention must be adapted or if the intervention must be terminated. Some of the potential barriers to the implementation of the intervention include, lack of financial and human resources, lack of political and institutional support, a limiting legal landscape, lack of trust in government, lack of consumer understanding and bad user experience.

Financial Framework

For any intervention to be appropriately designed and implemented, it must be adequately resourced. To upscale and implement behavioural nudges and behaviour change interventions, it is important to know what it will cost and how it will be funded, especially in an environment where emphasis is placed on infrastructure development and not behaviour change interventions. Although the current funding landscape is fragmented, the main funding for WC/WDM strategies still comes from a combination of government allocations, tariffs and developmental charges. South Africa also relies on external funding and partnerships from international organisations and development finance institutions to support WC/WDM efforts. While it appears as though there are a wide variety of funding options available to finance WC/WDM programmes, a very limited component of the budget actively goes to behavioural change interventions. Municipalities need to capitalise of existing opportunities and be open to new opportunities if they want to succeed in funding behavioural interventions in an environment of limited funds and competing priorities. To this end, implementing agents have started to consider alternate options for funding behavioural interventions, such as Performance Based Contracts. This offers municipalities the option of linking financial incentives to the achievements of specific and measurable behavioural change outcomes. Although the City of Cape Town has had great success in implementing behavioural intervention strategies during the recent drought, in reflection, one of the key recommendations made by the municipality is to establish a WC/WDM fund, that specifically focuses on WC/WDM interventions and by extension behaviour change interventions. A dedicated fund with specific instruction on the inclusion of behavioural interventions will ensure the ring fencing of funds and an integrated solution for managing demand and conserving

water. Other funding options that must be considered include co-funding mechanisms with civil society, international funders and the private sector.

Institute an Effective Monitoring and Evaluation System

An effective monitoring and evaluation framework for behavioural interventions is critical to ensure that the intervention remains relevant, is effective, meets the intended outcomes, that the correct information is used to make decisions, challenges and/or barriers to behaviour change are identified so that the intervention can be corrected accordingly and that municipalities remain accountable for implementation. By systematically monitoring and evaluating behavioural interventions, municipalities can make evidence and outcomes based decisions on whether or not to upscale the intervention. The monitoring and evaluation framework must be resilient so that it can adapt to changing circumstances and new information. Behavioural change often takes time, and measuring long-term impact requires sustained effort and resources, therefore the system must not be onerous, ensuring it can be maintained over the long term. If possible, integrate the reporting into existing monitoring systems and processes to enhance the sustainability of the intervention. All relevant stakeholders including the water users, must be involved in the design and implementation of the monitoring and evaluation framework. The system must be cognisant of the theory of change for the intervention and must include continuous and transparent reporting against clearly defined objectives, goals and specific and measurable targets. Regular feedback on monitoring and evaluation findings must be provided to all stakeholders.

ACKNOWLEDGEMENTS

The report is the result of transparent and constructive input and discussion from all participants at a programme, government, and partnership level. Thank you for your contribution, especially the City of Cape Town, City of Tshwane, eThekweni Municipality, Nelson Mandela Bay Municipality, Rustenburg Municipality and Ugu District Municipality.

A special thank you to the WRC for funding the project and, in particular, Mr Jay Bhagwan for his input and guidance.

LIST OF ACRONYMS

BCW	Behaviour Change Wheel
COM-B	Capability, Opportunity Motivation – Behaviour
CMA	Catchment Management Agency
CSA	Climate-Smart Agriculture
DWS	Department of Water and Sanitation
HWR	Home Water Reports
IBM	Information-Motivation-Behavioural
ICT	Information and Communication Technology
IDP	Integrated Development Plan
NDP	National Development Plan
NEMA	The National Environmental Management Act
NGO	Non-Governmental Organisation
NRW	Non-Revenue Water
NWC/WDMS	National Water Conservation and Water Demand Management System
NWRS	National Water Resource Strategy
NWSMP	National Water and Sanitation Master Plan
PBC	Performance Based Contract
ToC	Theory of Change
TPB	Theory of Planned Behaviour
SADC	Southern African Development Community
SALGA	South African Local Government Association
SDG	Sustainable Development Goal
SFWS	Strategic Framework for Water Services
WC	Water Conservation
WC/WDM	Water Conservation and Water Demand Management
WDM	Water Demand Management
WRC	Water Research Commission
WSA	Water Services Act
WSDP	Water Services Development Plan
WSP	Water Service Provider

KEY DEFINITIONS

Behavioural Change Intervention	Behavioural change interventions encompass a wide range of strategies focusing on various activities and initiatives that are designed to change specific behaviour patterns (Michie et al., 2011).
Behavioural Economics	Behavioural economics is a discipline within economics that expands on trying to understand the motivation and reasoning behind why people make certain decisions. This approach therefore assumes that people do not always act rationally or have the ability to evaluate all choices in front of them by comparing current and future cost and benefit streams.
Behavioural Nudges	Behavioural nudges form part of behavioural economics and is a form of a behaviour change intervention. Thaler and Sunstein (2009) defines a nudge as “any aspect of the choice architecture that alters people’s behaviour in a predictable way without forbidding any options or significantly changing their economic incentives”. Nudging therefore goes one step further than other behavioural change tactics as it alters the choice architecture (i.e., the set of potential choices available to an individual) by making the preferred option more convenient or salient.
Scaling up	Scaling up is the expanding, adapting, and sustaining of policies, programmes and projects in different places at the same time, to reach a greater number of people, in a quicker and more equitable way, with lasting effects (Westermann et al., 2015).
Water Conservation	Water conservation is the minimization of loss or waste, care and protection of water resources, and the efficient and effective use of water. It is not only reducing water wastage but also ensuring that water resources are managed sustainably and used efficiently.
Water Demand Management	Water demand management is the “adaptation and implementation of a strategy by a water institution or consumer to influence the water demand and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and political acceptability”. Water demand management constitutes a long-term, integrated approach to managing water in a way that conserves water, controlling use, influencing demand and promoting efficient use. It requires intensive cooperation between a variety of role-players through technical expertise, good governance, and a re-evaluation of the importance of water and recognition of the cumulative impact of individual uses.

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1 INTRODUCTION

1.1 Setting the Scene

South Africa is a water scarce country, rated as the 30th driest country in the world and described as a semi-arid country associated with common periods of drought and unpredictable rainfall. Water scarcity remains a challenge for government as population and economic growth continues in the face of increasing threats from climate change, water pollution and unsustainable use of the resource. According to the 2023 National State of Water Report, 98% of the country's available water resources are already allocated and the prognosis is that water demand is expected to increase over the next 20 years, while water supply is declining, therefore a supply deficit of 17% is expected in the year 2030. StatsSA Census 2022, confirms that South Africa's population grew by 1.8% from 51.7 million individuals in 2011 to 62 million in 2022, placing an additional requirement on a resource that is already fully allocated, especially considering it is not infinite in its capacity.

Furthermore, South Africa has not been spared the harsh effects of climate change. The country has seen rising temperatures and rapidly changing weather patterns resulting in erratic rainfall patterns and extended dry periods. This has not only impacted water availability in the country but has also compromised planning for future water needs. In the summer of 2016/17 seven of the eight metros in South Africa imposed water restrictions to manage demand.

The National Water and Sanitation Master Plan (NWSMP) (2018) estimates that municipalities are losing as much as 1660 million m³ of water per year through non-revenue water (NRW). NRW increased from 37% in 2014 to 47% in 2023, with the main cause being physical losses due to water leakages, inadequate maintenance of infrastructure, illegal water connections and the poor functioning or non-existent water meters all of which can be seen as having a direct effect on the water supply and management system.

Despite these constraints South Africans still consume on average 233 litres per person per day, which is approximately 64 litres more per day per person than the average global daily consumption of 173 litres per person per day (Bhagwan, 2024; DWS, 2018²). In this context, it is imperative to consider different and innovative ways to decrease water demand and increase water conservation. Historically municipalities have largely relied on engineering interventions, customer management mainly through education campaigns and tariffs to manage the demand for water. Water conservation and water demand management (WC/WDM) strategies and interventions were introduced by government to encourage efficient and sustainable consumption of water resources. These strategies include mandatory

and voluntary interventions, such as economic incentives, technological solutions and policy instruments and regulations. In recent years, municipalities, mainly in the developed world, have begun implementing behavioural economics as a means for more sustainable behaviour change in the use and management of water. This approach is applauded as it remains a non-price and non-punitive intervention which will not exacerbate the economic inequality in South Africa.

Should proactive and innovative strategies and interventions not be implemented when trying to conserve water resources and decrease water consumption and demand, the country could experience low agricultural outputs, increase water prices as well as increases in poverty and inequality between water consumers. There is growing consensus that reduction in water use driven by investments in water efficient appliances and technologies is not as effective if not supported by change of individual habits and water consumption patterns.

1.2 Purpose and Scope of the Research

The objective of the research is to provide a framework for a strategy that introduces behavioural nudges as a social change intervention available to municipalities to influence water usage behaviour to ensure the long-term sustainability and security of water resources in South Africa. The purpose of the strategy is to provide guidance, at a municipal level, on a standardised approach to scaling up initiatives and processes to create a deliberate effort for increasing the impact, uptake and application of behavioral nudges in South Africa. The strategy is primarily focused on domestic users. The strategy aims (1) to create advocacy for the inclusion of behavioural nudges, as an innovation behavioural economic interventions, into WC/WDM practices; (2) to encourage discussions on the use of behavioural nudges as a tool to change user and usage behaviour; (3) to inform the development of a behavioural nudge policy at a municipal level; and (4) to inform the development of an action plan that municipalities can implement to realise change.

1.3 Approach to the Research

The evaluation was conducted in three main steps namely: (1) planning and design, (2) data collection and consultation, (3) analysis and report writing. Below, is an overview of the overall impact evaluation study starting from the inception phase to the project close out phase.

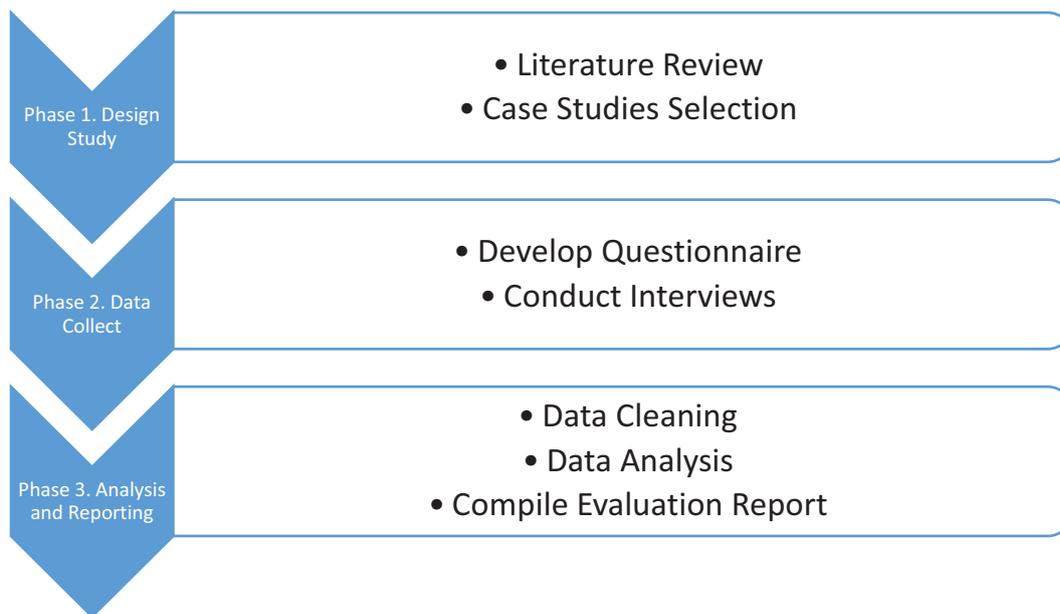


Figure 1 – Research Approach

Primary and secondary data were used to inform the framework for the strategy.

The secondary data included the following sources:

Document Review: Documents reviewed included project information where behavioural nudges and other behavioural change interventions were implemented by municipalities.

Literature Review: Literature reviewed included academic articles and research reports published on similar programmes and initiatives conducted internationally and locally.

Interviews: Officials from the water and sanitation departments from the City of Cape Town, City of Tshwane, eThekweni Municipality, Nelson Mandela Bay Municipality, Rustenburg Municipality and Ugu District Municipality were interviewed. The interviews were guided by a standardised questionnaire.

1.4 Ethical Considerations

Ethical considerations were applied holistically across the research, with the team ensuring that all reporting information was kept confidential. No information was shared with any party not relevant to the research and without the consent of the participant. Further to this, as and when necessary, respondents' identities were kept anonymised so that freedom to communicate was ensured, thus contributing to the veracity of the research. All participants provided consent to be part of the research.

1.5 Limitations to the Research

Many of the interventions implemented by municipalities and government departments did not have any meaningful monitoring data to assess the change in behaviour, hence the research relied heavily on the perceptions of the participants.

In addition, the design of the behavioural change interventions were not documented therefore vital information such as business plans, project rationale and the design of the intervention were unavailable for review. It was difficult to ascertain impact of the intervention.

1.6 Why Developing a Strategy to Infuse the Uptake and Application of Behavioural Interventions is Necessary

As the country enters a complex hydro-extreme environment, water usage behaviour must be influenced for long term sustainability and water security. Typical WC/WDM interventions, such as restriction policies and price mechanisms, are known to generate resistance from the community, resulting in a lack of political will to implement them. However, voluntary water conservation through behaviour change offers an alternative that has been proven to work. Changing human behaviour in a non-price and non-punitive way is difficult but not impossible and a commonly overlooked strategy is the use of behavioural nudges within WC/WDM strategies.

Driving efficient use and management is the key to future water security. Even though municipalities are required to promote WC/WDM when executing their functions, many do not have a dedicated WC/WDM strategy and the ones that do often lack specificity. In particular, the implementation of water conservation behavioural interventions in South Africa has been poor, despite many pilot interventions. From an economic perspective, behavioural change interventions especially behavioural nudges are an attractive policy option because of its low cost. That they also have significant, long-term impacts of water consumption further increases the allure of such interventions. Hence, a national strategy that introduces behavioural interventions as a tool for water use management and infuses the uptake and application of such behavioural interventions is necessary. The strategy will also provide a standardised and monitored approach for the effective reduction of water consumption and demand.

2 LITERATURE REVIEW

Published and grey literature was reviewed with the aim of providing an overview of the use of behavioural nudges and other associated behaviour change tools to encourage the reduction of water use and to outline best practices when designing and upscaling behavioural nudges for water conservation purposes. The review starts off by providing insight into the mechanisms of action and information processing that determine human behaviour from the perspective of behavioural psychology. It proceeds to outline the use of behaviour change interventions within related sectors such as public health, energy consumption, and environmental sustainability. Thereafter, national and international case studies on the use of behaviour change interventions to achieve water conservation are analysed to determine successes and failures. Insight into the variables that impact the design and implementation of behaviour change interventions, such as characteristics of the target audience and receiving environment, is provided. Finally, the literature is reviewed to gain insight into the mechanisms for scaling up and improving the uptake of behaviour change interventions for water conservation purposes.

2.1 Mechanisms that Determine Human Behaviour

2.1.1 Mechanisms of Action

In the past half-century, the field of behavioural psychology has attempted to understand the mechanisms that influence human behaviour, or mechanisms of action. Most of the models that explain human behaviour are built on the premise that individuals make decisions based on rational considerations. A leading model is the Theory of Planned Behaviour (TPB), which was an extension of the Theory of Reasoned Action. The TPB is a cognitive theory first proposed by Azjen in 1985, which states that human behaviour is the result of behavioural intentions. These intentions are determined by an individual's attitude towards the behaviour, their belief of what is expected of them by others, and how difficult or easy they think implementing the behaviour change will be. This model assumes a relatively high level of personal volition and willpower. Building on existing work, the Information-Motivation-Behavioural (IBM) model was first developed by Fisher and Fisher in 1992 to understand the psychological determinants of HIV risk and preventative behaviour. The model asserts that for individuals to initiate and maintain health-promoting behaviours, they need to be well informed, motivated to act and possess the right behaviour skills. The Behaviour Change Wheel (BCW) was developed based on 19 frameworks of behaviour change that had been identified in the existing literature. The BCW is a framework for designing and evaluating interventions that

aim to change human behaviour. It consists of three components: the Capability, Opportunity Motivation – Behaviour (COM-B) model, the intervention functions, and the policy categories. The COM-B model describes the sources of behaviour as Capability, Opportunity, and Motivation. The intervention functions are the methods or strategies that can be used to change behaviour, such as education, persuasion, or coercion. The policy categories are the types of actions that can be taken by authorities or organisations to enable or support behaviour change, such as regulation, communication, or service provision.

In recent years, the recognition that human behaviour is not solely based on rational considerations has grown. An individual's behaviour is not always aligned with their intentions. This discrepancy is called the value-action gap, also known as the green attitude-behaviour gap in green consumption. Essiz et al. (2022) explain that even though an individual has strongly held pro-environmental values, or intentions, this frequently fails to translate into pro-environmental behaviours. This indicates that values or intentions are not always the driving force behind decision-making and more unconscious processes are likely at play. Kahneman (2003) distinguishes between two (2) systems of information processing. System 1 is unconscious, energy-efficient, quick, and based on intuition and emotions. System 2 is conscious, energy-consuming, slow, intentional, and based on cognition. Kahneman suggests that system one generally processes more information, since system two requires more mental energy, time, and capacity. Based on these insights, Koop et al (2019) propose a tripartite model of information processing to categorise different behavioural influencing tactics used for domestic water conservation by drawing on key insights from behavioural psychology (especially in the domains of health and environmental behaviour): a reflective, semi-reflective, and automatic route. The reflective route involves conscious processing of information (system 2), where attitudes are shaped by rational arguments, relevant experiences, and knowledge. The automatic information processing route, on the other hand, relies on an automatic response (i.e. system 1), without the involvement of cognition. Koop et al (2019) recognise that interventions often exist within a continuum ranging from reflective to automatic behaviour, prompting them to identify a third category: semi-reflective. The semi-reflective system acknowledges that system 1 and 2 do not function in isolation from one another. People use rules of thumb and simple heuristics to form attitudes and make decisions. They look for peripheral stimuli, which are easy cues that tell them what choices to make.

2.1.2 Types of Behaviour Change Interventions

Behaviour change can be achieved through a variety of behaviour change interventions. Behaviour change interventions are designed to target a specific process (i.e., mechanism of action) through which behaviour change occurs, which changes as a result of the active

ingredient within an intervention (i.e., behaviour change intervention) (Connell et al., 2018). To design interventions that are effective and lead to sustained behaviour change, it is important to understand the link between behaviour change interventions and mechanisms of action and the pathways through which behaviour change occurs. Behaviour change interventions can be used to target all three systems of information processing (i.e., reflective, semi-reflective and automatic).

Different ways of categorising behaviour change methods exist (Grilli & Curtis, 2021). In this literature review, the categorisation provided by Koop et al. (2019) will be followed. In their 2019 review of empirical studies on behavioural influencing tactics for water conservation, Koop et al. identified eight categories of behavioural influencing tactics that each fall under either the reflective, semi-reflective or automatic route. Behaviour change interventions that target the reflective route of behavioural influence are *knowledge transfer* and *increasing self-efficacy*. Behaviour change interventions that work through the semi-reflective route of information processing are *social norms*, *framing*, and *tailoring*. The automatic route includes interventions that use *emotional shortcuts*, *priming* and *nudging*. Most interventions that have been studied use one or more of these behavioural influencing tactics to encourage water conservation and they are not mutually exclusive.

Knowledge Transfer

Interventions that include a knowledge transfer aspect, such as education and awareness campaigns, are very common and are often the default approach to achieving behaviour change. Knowledge transfer interventions rely on the knowledge-deficit model, which states that in the absence of information, behaviour will not change (Ehret et al., 2016). It is predicated on the idea that the more knowledge people have around water scarcity issues, the more likely they are to adopt water conservation behaviours.

Increasing Self-Efficacy

Increasing self-efficacy involves empowering individuals to make them believe in their ability to implement their intended behaviour. Self-efficacy relates to the ability of an individual to make a choice and perform a behaviour (Hamilton et al., 2022). This means that knowledge alone is not enough for someone to adapt their behaviour. People need to consider behaviour change feasible and know how they can change their behaviour.

Social Norms

Social norms can be leveraged to influence behaviour because of the tendency of individuals to conform to their social environment. Individuals are likely to bring their behaviour into conformity with their peers when they are confronted with information that describes their

behaviour in relation to the behaviour of their peers (Bhanot, 2021). The literature distinguishes between descriptive and injunctive norms. Descriptive norms simply describe the behaviour of others, whereas injunctive norms convey social approval or disapproval of a specific behaviour.

Framing

Framing as a behaviour change intervention involves presenting information in a way that influences how people perceive and respond to it. Framing theory argues that an issue is interpreted differently based on the individual's perspective, and the meaning can change depending on the frame. By selecting and emphasising specific aspects of a message, one can achieve the desired interpretation and subsequent response (Kang & Hong, 2021). For example, framing a message as a gain or a loss can have a different effect on an individual's motivation and decision-making.

Tailoring

Tailored behaviour change interventions are those designed to convey individualised messages that address the individual's characteristics, experiences, goals or preferences, in order to maximise the effect and impact (Beck et al., 2010). In the context of water conservation, tailoring is often deployed through the use of smart meters. By providing near real-time information on people's actual water use, the message regarding water conservation is more impactful.

Using Emotional Shortcuts

Using emotional shortcuts refers to the method of evoking an emotional response to promote behaviour change. Instead of merely providing information to inspire action, these influencing tactics often use animated videos or images to evoke a positive or negative emotion. The use of humour is also known to increase the receiver's attention to a message. Gamification is another approach that involves evoking an emotional response (Koop et al. 2019).

Priming

Priming influences behaviour change by exposing people to stimuli that activate certain unconscious associations or schemas in their minds, such as a word or a smell. For example, priming someone with words related to cleanliness can make them wash their hands more or clean up their environment. Priming can be used to facilitate behaviour change by creating a favourable context for the desired action or by increasing the salience of the benefits or costs of the behaviour. Primes are especially effective in triggering goal-related behaviour if the primed outcome is valued by the individual (Tate et al., 2014).

Nudges

It must be noted that the term 'nudge' is not always used appropriately in the literature and can be confusing. At times, researchers use the term nudge as an overarching term for behavioural interventions that target automatic behaviours or habits, when they are referring to a different type of behaviour change intervention, such as education campaigns or social norms interventions (Grilli & Curtis, 2021).

Thaler and Sunstein (2009) define a nudge as “any aspect of the choice architecture that alters people’s behaviour in a predictable way without forbidding any options or significantly changing their economic incentives” (p.6). A nudge cannot be a mandated or forbid any options, and it must be cheap and easy to avoid. Nudging goes one step further than other behavioural change tactics as it alters the choice architecture (i.e., the set of potential choices available to an individual) by making the preferred option more convenient or salient. The goal of a nudge is altering people’s behaviour, not so much their attitude (Lindahl & Stikvoort, 2015). An example of a nudge is changing the size or colour of recycling bins to make them more appealing, or setting the preferred choice as the default option, such as an energy utility company providing green energy unless requested otherwise.

2.2 Review of Behaviour Change Interventions for Water Conservation

The use of different behavioural change interventions to reduce water conservation by analysing national and international case studies were reviewed. The review is structured according to type of behaviour change intervention, i.e., *knowledge transfer, increasing self-efficacy, social norms and comparisons, framing, tailoring, using emotional shortcuts, priming and nudges*. However, it must be noted that many interventions use one or more behavioural influencing tactics and overlap between interventions exists.

2.2.1 Knowledge Transfer

Interventions that use *knowledge transfer* tactics to change behaviour are frequently applied within the water conservation space. Practitioners believe that by providing information on water scarcity issues and water conservation practices, knowledge transfer interventions can raise awareness, change consumer attitudes and enhance water conservation behaviour (Grilli & Curtis, 2021; Koop et al., 2019). Common interventions include media campaigns, handouts, newsletters, and educational interventions.

South Africa has seen the implementation of many awareness campaigns in the past decade and a half. Some campaigns have been implemented during water scarce periods, such as the Slow the Flow campaign of the Cape Town drought of 2017/18 (Ziervogel, 2019). Other

campaigns are implemented year-round and aim to increase public awareness of the need to value and conserve water, such as the Water Wise Conservation and Education campaign, the National Water Week campaign and the I AM WATER campaign. Van der Vyver (2016) studied the level of awareness of the water crisis amongst South Africans. He concludes that the vast majority of South Africans (70%) have received some level of information regarding responsible water use in the past and 80% of respondents consider themselves to be responsible water users, even though the level of use of participants included in the sample varies greatly, from 0-59 to 240+ Liters per day. When asked about the importance of water consumption habits, most respondents indicated that mankind should change their water consumption habits. However, 64% of participants indicated that they do not think that they themselves need to change their water consumption habits, as they feel as though their consumption levels are sufficiently low. Most participants reported that they are aware of the Water Wise campaign initiative implemented by Rand Water. This indicates that awareness campaigns can increase the public's knowledge and awareness of water scarcity issues and can promote the importance of water conservation practices. However, the discrepancy between perceived and actual water conservation by consumers can prevent meaningful behaviour change from happening.

In their 2019 article on the effects of water-saving education in Taiwan, Wang et al. set out to measure the difference in water literacy and awareness of subjects before and after engaging in water-saving activities at an applied science museum. The activities were designed by professionals and included hands-on activities and interactive teaching aids. Participants were asked to fill out a questionnaire after participating in the activities to measure the difference in water knowledge, attitude and behaviour. The authors found that the activities improved the water literacy, attitude and water-saving intention of subjects, but minimal correlation was found between water knowledge and water-saving attitude before or after the activities. They also found that socio-economic variables such as age, gender, income and household water expenses can influence the attitude and behaviour related to the use of water. Whether the effects will be retained over time is unclear, due to the limitations of the study design. Xiong et al. (2016) set out to determine how education affects water-conservation behaviour in China, by conducting a survey with 237 participants in Guangzhou to determine the attitudes of citizens towards water conservation. They found that water-conservation awareness does not necessarily lead to a sense of urgency to conserve water or to an increased uptake of water-conservation actions. They also found that school-based education can have a positive effect on water-conservation behaviour and more highly educated individuals are more likely to exhibit good water-conservation behaviours. However, these behaviours are self-reported, and it is widely accepted that consumers underestimate their own water use and overestimate

water conservation behaviour. The authors recommend increasing the provision of water education in primary and junior secondary schools, since it is very rare in the current curriculum.

Media campaigns are often implemented during times of increased water scarcity, such as droughts, and combined with price incentives and water use restrictions. The combination has been shown to be successful in reducing water consumption, especially when high-income and high-consuming households are targeted (Koop et al., 2019). Evidence also suggests that education and awareness methods are more effective if a pre-existing interest in environmental issues and willingness to engage in pro-environmental behaviours exists (Grilli & Curtis, 2021). However, the literature shows that an increase in pro-environmental knowledge or attitude does not necessarily foster pro-environmental behaviour (Berk et al., 1993), which is a shortcoming of such interventions.

Considering that awareness campaigns are often combined with other interventions, it is difficult to accurately evaluate the efficacy of the knowledge transfer interventions as an independent strategy. It is also not clear from the literature how effective knowledge transfer interventions are in the long term, as most of them are reactive and short-lived and little consideration has been given to its long-term effects. Additionally, many experimental studies on knowledge transfer interventions rely on participants self-reporting on their change in knowledge, attitude or behaviour. It has been established that individuals are likely to underestimate their consumption levels and overestimate their conservation efforts.

2.2.2 Increasing Self-Efficacy

As was mentioned before, the intention to conserve water does not necessarily lead to water conservation behaviour. To increase an individual's *self-efficacy*, they need to be empowered in the belief that they have the capacity and ability to implement their intended behaviour. Many knowledge transfer interventions do not target the action that is required to translate an intention into a behaviour. People need to believe in their ability to change their behaviour and need to be given the right tools and tips to successfully implement behaviour change.

Addo et al. (2019) conducted an experiment to examine the effectiveness of two (2) different message types on water scarcity concern and intention to act amongst residents of New South Wales, Australia. Participants were assigned to watch one of two household water conservation videos. The first message contains information on severe water scarcity, as well as water-saving tips and strategies. Message two provides information about severe water scarcity, but no water-saving tips or strategies. The authors found that message one was more effective in increasing concern regarding water scarcity and intention to act. Further analysis showed that messages that include water-saving tips and strategies increase a household's

capacity, or self-efficacy, and have a greater impact on water-conservation behaviour. Similarly, Lee and Tansel (2013) found that by retrofitting senior or low-income households with high-efficiency household appliances, the respondents' sense of self-efficacy was increased through increased ability to mitigate drought. This resulted in positive attitudes amongst respondents for the water conservation programme, subsequently leading to actual water savings.

Many interventions use aspects that relate to *self-efficacy* and combine them with other behaviour change 'ingredients'. Tips and strategies on how to achieve water conservation are often included in awareness campaigns, Home Water Reports (HWR) and other forms of feedback, and social norm or comparison interventions. It is found that interventions that include an aspect of self-efficacy, usually in the form of tips and strategies, are more effective than interventions that do not include such aspects (Jesoe et al., 2021; Vivek et al., 2021; Warren et al., 2018).

2.2.3 Social Norms and Comparison

Interventions that use *social norms* and *social norms comparisons* are based on the understanding that people want to conform to their social environment. It is known that when an individual is presented with information that describes their behaviour in comparison to peers, or to peers' expectations, they are inclined to bring their behaviour into conformity (Koop et al., 2019). The literature makes a distinction between descriptive norms, which simply describe the behaviour of others, and injunctive norms, which convey social approval or disapproval of a specific behaviour. Social norms interventions are commonly used to reduce water consumption and found to be effective (Feizi & Khatabiroudi, 2023; Lede et al., 2019; Bernedo et al., 2014; Bhanot, 2018).

Bhanot (2018) presents the results of a large-scale randomized field experiment on the use of injunctive norms on water conservation behaviour that involves over 40 000 households in California. Households received either a No Drop treatment which included social information without a visual cue, a Drop treatment, which included social information with a basic visual cue (i.e., a basic water droplet cartoon), or the Injunctive Drop treatment, which included social information with an injunctive message added to the visual cue (a water droplet cartoon with a smiley, neutral or frowny face). A control group did not receive any treatment. Bhanot found that the treatment that included an injunctive norm was more effective than the other two treatments in reducing water use.

Bernedo et al. (2014) describe the implementation of a social norms-based intervention that uses either descriptive or injunctive norms. Three treatments are used to influence water consumption in Atlanta, USA. The first treatment is a message that contains technical

information as well as tips on how to reduce water consumption. The second treatment constitutes a weak social norm message by including a signed letter encouraging the household to implement the tips using norm-laden language. The third treatment constitutes a strong social norm message by augmenting the weak social message to include a social comparison aspect. The first treatment was not found to be effective. The strong social norm treatment was found to be significantly more effective than the weak social norm message. The effect was found to be persistent, suggesting either a change in habits or capital stock in the home.

Feizi and Khatabiroudi (2023) used two treatments, a social comparison treatment and a public environment treatment, to influence households in Torbat Heydarieh, a water stressed city in Iran, to use less water. The social comparison treatment gave insight into the respondents' own water consumption, as well as the minimum and average water consumption in their neighbourhood. The public environmental treatment did not include this social comparison aspect and instead provided respondents with facts about the water crisis and tips on how to reduce water consumption. The authors found that the social comparison treatment was more effective in reducing water consumption. In fact, households that received the social treatment reduced their water consumption by about 6%. In contrast, the public environmental treatment did not affect water consumption behaviour. The authors noted that price was very unlikely to be an influencing factor, as the price of water in Iran is very low and the sample included middle-class households.

Miranda et al. (2019) describe the use of a social norm intervention to be effective in reducing average water consumption in Costa Rica. The treatments were designed by keeping in mind the realities of implementing interventions in a developing country and the logistical and capacity constraints that exist. The treatments included pasting a coloured sticker onto the existing water bill, whose design leveraged social comparison, smiley and frowny faces, as well as water saving tips. Using the water bills system that is in place provided a low-cost solution to implementing the intervention. The use of smiley and frowny faces is beneficial where literacy is an issue and allows for the intervention to be implemented by nonspecialized municipal staff.

Lede et al. (2019) tested the social identity approach to designing social norms-based interventions across four water scarce regions in England. They argue that social norms-based interventions are more effective when they are tied to group membership and communicate in-group norms, rather than general social norms. This means that the influence of social norms messaging is stronger when the referent group is closer and more similar to the individual. For example, a Californian household's energy use was more significantly influenced when compared to members of their community, followed by residents in their city

and Californians in general. The authors confirmed that an in-group social norms appeal is more effective at reducing water use than a general social norms appeal. This confirms that a behaviour change intervention must be designed with the target audience in mind, to maximise effect.

Social norm-based interventions are effective at reducing water consumption in a variety of contexts. The literature also indicates that social norm-based interventions can be tailored to fit the differing realities of low-, middle- and high-income countries. Research has found that social comparison interventions have a greater impact on the water consumption of high-consuming households. Additionally, the effects of social norm-based interventions are often found to be resilient (Koop et al., 2019; Jessoe et al., 2021). Social norm-based interventions are often combined with other strategies, such as feedback (*tailoring*) interventions. Home Water Reports (HWR) are often infused with social comparison messaging, which is shown to be effective, even in times of drought (Jessoe et al., 2021)

2.2.4 Framing

Framing refers to the way an aspect of a message is selected or emphasized to achieve a desired interpretation or perspective. The response to a specific request can differ greatly, based on the way it is framed. Framing often makes use of unconscious biases, such as preference for the status quo, the preference to avoid a loss and the tendency to interpret a message in a way that confirms one's existing attitude (Kahneman, 2003).

Cauberghe et al. (2021) studied the individuals' perception of water and its uniqueness to determine whether the perception of water has an impact on water conservation behaviours. They found that framing water as a unique natural resource, rather than a commodity, and emphasizing its pureness and aesthetics increased the value individuals attach to water, subsequently increasing their concern for its scarcity. Both concern for water scarcity and perceptions of water as unique were found to increase individuals' moral obligation to conserve water, which is likely to lead to increased water conservation behaviour. The authors found that older respondents, respondents with lower levels of education and women were more likely to perceive water as a unique resource and express stronger intentions to conserve water. These findings have implications for the design of water conservation communication campaigns and educational programmes. Katz et al. (2018) also found that when people perceive water as a basic need, assertive messages around water conservation might be perceived as inappropriate. Framing the concept of water and its associated meanings is, therefore, an important aspect of behaviour change interventions.

Zhuang et al. (2018) set out to examine the use of different temporal frames (i.e., present and future) to influence how people perceive and react to water scarcity and conservation. In their

experiment with 133 participants from the USA and China, they found that framing water conservation as a direct impact issue led to more positive attitudes towards water conservation than framing it in terms of future impacts. Interestingly, Chinese participants were more likely to respond positively to future-framed messages than their US counterparts, indicating that cultural identity plays a role in the way messages should be framed to be effective.

2.2.5 Tailoring

Tailoring takes the approach of communicating individualised messages to make communication more effective. Tailoring aims to increase the relevance, personalization, and effectiveness of the intervention by addressing the specific factors that influence the behaviour of interest (Koop et al., 2019). Efforts related to tailoring for water conservation have emphasised the use of smart meters to provide almost real-time consumption based feedback on water use. Consumers are ill-informed about the amount of water they use and for which activities. Water billing information is generally aggregated over extended periods, which makes it difficult for users to link their water use to their behaviour (Visser et al., 2021). It is argued that improved accessibility and frequency of consumer usage feedback will alter usage decisions and can achieve short-term water savings between 2.5% and 28% (Cominola et al., 2021).

Daminato et al. (2021) aim to better understand the effect of smart water metering technology on water consumption behaviour in La Laguna, Tenerife, through the evaluation of a large-scale programme implemented by a local municipal water company. The smart meter technology allowed consumers to access daily real-time water use feedback through an online portal. The authors concluded that an average 2% water saving can be attributed to the installation of smart metering technology. This reduction in water use is found to be maintained. One of the mechanisms that was found to be especially effective in achieving the reduction in water use is the use of notifications when water consumption reaches undesired levels. The authors found that the intervention was more impactful on high-level users as they reduced their water use significantly more than below-median level users. In fact, below-median households increased water consumption after the installation of the smart meter. This finding is consistent with other literature that reports on small users increasing water consumption after receiving more information.

In their 2021 study, Visser et al. aimed to assess the impact of two behaviour change interventions aimed at reducing water consumption that were implemented in 105 schools in Cape Town during the drought of 2017/18. The first intervention includes the installation of smart water meters and provision of real-time user feedback. The second intervention includes the same level of information feedback through smart meters, as well as an interschool

competition. A water consumption reduction of 15-26% was achieved, despite the intervention being implemented during a drought. However, no significant difference was found between both interventions.

Cominola et al. (2021) conducted an observational study on 334 households in Valencia, Spain. All households were previously fitted with smart water meters. Through the study, the treatment group was provided access to the SmartH20 digital platform. This web and mobile application enables households to visualise smart meter-based information and feedback and compare their water use with the consumption of peer households. The platform also enables households to set individual water conservation targets, interactively learn and share water conservation tips and strategies, and engage with gamification functions to earn points and rewards. The authors found that households reduced their water conservation by 3.9% on average. A longitudinal study demonstrates that the short-term effects persisted in the medium and long term, making this intervention suitable to foster sustainable and durable water conservation behaviour change. It was also noted that receiving smart meter feedback with hourly sampling frequency, rather than daily, resulted in more frequent water conservation behaviours, confirming the importance of the availability of high-frequency data.

The length of exposure of consumers to feedback, as well as the location, display and timing all determine the effectiveness of tailoring interventions. Compared to more low-tech tailoring interventions, such as paper-based messages, ICT software and smart meters are found to be most effective. Such interventions have a bigger impact when targeting high-use consumers, as the cost-saving benefit is greater (Koop et al., 2019). The obvious downside to these interventions is that they require significant investment, technical capabilities and high frequency, making them less cost-effective. These interventions are not necessarily appropriate for low to middle income countries, unbilled households or households that pay a flat rate for water use.

2.2.6 Using Emotional Shortcuts

Using emotional shortcuts to inspire behaviour change refers to the use of interventions to elicit positive or negative emotions. Koop et al. 2019 report that positive emotions make individuals more likely to adopt a cooperative and trusting approach. Negative emotions are more likely to appeal to an individuals' moral obligation to act. Humour can also be used to increase a receiver's attention to information and reduce resistance.

Fang and Sun (2016) tested a range of interface formats, from emotionally neutral to evoking affection, to test whether eco-visualisations can evoke sustainable behaviours. The three interfaces are (1) numeric, (2) a water droplet, and (3) an animation of a swimming fish who

can die if water use is increased. They found that intrinsic motivation for water conservation was higher for the swimming fish interface.

Gamification is also used to elicit an emotional response and behaviour change. *Drop!* is an example of a gamified intervention. The physical digital card game is about a girl who wants to save water and a monster who is clumsy and keeps spilling water. Water consumption becomes associated with achievement, leading to increased water conservation behaviour (Koop et al., 2019).

2.2.7 Priming

Priming is a technique that aims to influence someone's behaviour by exposing them to certain stimuli before the target behaviour occurs. For example, showing images of healthy food, reminding someone of the benefits of exercise, or reading a social story about going to the dentist can prime the person to make healthier choices, be more active, or reduce their anxiety. Such tactics can be used by water utilities to encourage water conservation behaviour through water bills, websites and engagement programmes. Priming is not yet actively utilised within pro-environmental and water conservation behaviour research. It offers an avenue for behaviour change that needs to be explored further.

2.2.8 Nudges

A *nudge* is a paternalistic behavioural intervention that alters the choice architecture to make the preferred choice easier or more salient, leading to higher societal well-being. A nudge does not rule out other options or offer economic incentives and must be easy to avoid (Thaler & Sustein, 2009). The goal of a nudge is to influence behaviour, rather than intention or attitude. Nudges are commonly used to stimulate pro-health behaviour, as outlined in section 3.1 of this literature review. The use of nudges for water conservation purposes remains largely unexplored, despite overwhelming evidence that nudges are effective at influencing behaviour. The effectiveness of behavioural nudges depends on several factors, such as the context, the target population, the type and intensity of the nudge, and the desired outcome. Nudges need to be carefully designed for them to work. The paternalistic nature of nudges must also be considered, considering concepts such as free will (Lindahl & Stikvoort, 2015).

2.3 Considerations for the Design and Implementation of Behaviour Change Interventions

Behaviour change interventions can be influenced by several variables, including the characteristics of the target population, the context and setting of the intervention, the design and delivery of the intervention, and the evaluation and feedback of the intervention. These factors impact the effectiveness, acceptability, feasibility, and sustainability of behaviour

change interventions. Therefore, it is important to take these variables into consideration when planning, implementing, and evaluating behaviour change interventions.

2.3.1 Water Scarcity Conditions

The literature on water conservation behaviour reports that effects of behaviour change interventions are impacted when they are implemented during water scarce periods, such as droughts (Bernedo et al., 2014; Brick et al., 2023; Visser et al., 2021; Jessoe et al., 2021; Fielding et al., 2013). A drought can be seen as both a driver and a constraint for water conservation interventions, depending on the context and the type of intervention. Understanding the interactions between drought and water conservation interventions can help design and implement more adaptive and robust water management strategies in the face of climate change.

The literature demonstrates that even when water consumption levels are low to begin with, voluntary demand management strategies can bring about further water savings. However, differences between treatments and behavioural influencing tactics are less pronounced than interventions implemented outside water scarce conditions. Jessoe et al. (2021) report that despite the existence of a 25% drought conservation mandate, the issuing of Home Water Reports still led to a conservation effect of 4 to 5%. Bernedo et al. (2014) also found that their intervention using technical information, moral suasion and social comparison was effective, even during a period of extreme drought. Brick et al. (2023) aimed to shed light on the potential crowding out effect when implementing multiple policy tools at the same time. They found that the behavioural change interventions they implemented during a period of severe drought in Cape Town provided additional water savings on top of existing policies, with no indication of crowding out.

Research indicates that education campaigns might be more effective in regions that have experienced water shortages (Nieswiadomy, 1992). Fielding et al. (2013) describe how the drought conditions that were previously experienced by participants in Queensland likely framed water conservation as a salient issue and water conservation activities as normative, enhancing water conservation efforts. This finding highlights the importance of framing water as a finite and precious resource. The authors also speculate that the recent experience of drought may have lessened the impact of social norms and feedback on water conservation, since respondents were already engaged with water conservation efforts. This also means that less engaged households may be more sensitive to social norms and feedback interventions than more engaged households.

2.3.2 Country Context

The context of the country in which behaviour change interventions are implemented has implications on the effectiveness and feasibility of that interventions. This includes the social, cultural, religious, historical and political context of a country, as well as the level of income and development.

Highly developed countries tend to have more access to technology, media, and communication channels, which can facilitate the delivery and dissemination of digital interventions, such as mobile apps, online platforms, or wearable devices that can provide tailored feedback, reminders, or support to users. Developing countries may face challenges in using these technologies, due to limited internet access, affordability, or literacy. Additionally, developing countries are more constrained in terms of resources and implementation capacity. Miranda et al. (2020) explain how they designed their behaviour change intervention with Costa Rica's development context in mind. Firstly, the intervention did not require personalized feedback through the use of smart meters or other metering technologies. Secondly, the intervention was linked to the existing utility bill, instead of redesigning the bill as a whole. Thirdly, the decision to use brightly coloured stickers was made to make the intervention easily implementable by nonspecialized municipal staff and to circumvent literacy issues.

Inequality within a country also determines the design of an intervention and its appropriate target audience. Countries that have more diverse and multicultural populations may need to adapt and customize behaviour change interventions. South Africa is the most unequal country in the world (World Bank, 2022), which highlights the benefits of non-monetary behavioural interventions, as well as the need to design interventions that consider income and usage level. Brick et al. (2023) confirm the need to design interventions with income level in mind and found that understanding the heterogeneous responses to behavioural interventions improves the cost-effectiveness of interventions.

Cultural values, (religious) beliefs and norms differ between countries, as well as population groups within countries, which may influence the acceptability, relevance, and effectiveness of certain interventions. Feizi and Khatabiroudi (2023) hypothesised that social norm and comparison interventions may be less effective because of existing Islamic religious messaging that calls for frugality in consumption. They found that their intervention was still effective, noting a lack of crowding-out effect and proving that such interventions can work within different institutional and normative settings. The cultural, historical and political context of a country also plays a role in the effectiveness of behaviour change interventions and the possibility of transplanting an intervention from one country to another. Timm and Deal (2018)

touch on this in their paper on Singapore's successful water management strategies and the reasons why they are so widely accepted in Singapore. They hypothesize that Singapore's unique political context and national culture may have supported the success and acceptance of its water recycling programme. Singapore is considered a 'soft' authoritarian regime with a benevolent dictator, which allows for more policies to control the press and limit freedom to assemble. This allows the government to have a higher influence on public opinion. Additionally, Singapore is considered a modernist society with an optimistic and progressive view of technological advancement. This leads the authors to warn against democratic countries attempting to copy Singapore's water success story, as it is likely to garner different results.

2.3.3 Demographic Determinants

The results of previous studies on demographic determinants of water use and conservation behaviour are inconsistent and inconclusive, as different demographic variables may have different effects, depending on the context, type of behaviour, and measurement methods. It is clear that demographic factors like educational level, age and gender all play a role in determining a consumer's water use and conservation behaviour. However, the associated correlation is not always clear (Koop et al., 2019).

Education can affect water conservation behaviour by shaping the knowledge and skills of water users. Higher education levels may increase the awareness and understanding of water issues, such as scarcity, quality, climate change and environmental impacts. Higher education levels may also enhance the ability and willingness to adopt water-saving behaviours, such as reducing consumption, reusing water or harvesting rainwater. In practice, higher-educated people consume more water, despite being more committed to water conservation. According to Fielding et al. (2012), households with higher education levels have stronger intentions to conserve water and express a more pro-conservation attitude. When looking at actual water use, it becomes clear that lower education households engage in more water conservation behaviours and use less water than higher-education households. The link between educational level, income and water use is apparent.

With regards to the age of consumers, the literature is less clear on how it affects water consumption behaviours and effects are dependent on geographic location. Within the context of South Africa, it seems that older people consume less water than young people (Murwirapachena, 2021). However, this might be more closely related to the phase of life and associated lifestyle, rather than age. Retired people are home more and are, therefore, more likely to consume a lot of water (Fielding et al., 2012). Similarly, teenage children are high water users. Cauberghe et al. (2021) found that older respondents, respondents with lower

levels of education and women were more likely to perceive water as a unique resource and express stronger intentions to conserve water.

When looking at gender as a determinant of water consumption, findings generally conclude that females consume more water than males. Tong et al. (2017) found that Chinese women in rural Northern China consumed twice as much water than men. However, they also adopted more water conservation practices than men. The authors also found that male users were more highly affected by concerns regarding water supply shortages, whereas females were more highly incentivised by potential cost-savings. Murwirapachena (2021) also found gender disparities in water use in the context of South Africa, with higher recorded water consumption for women compared to men. However, these findings must take into consideration existing gender norms and relations that determine the daily activities that women partake in. It is likely that women's water consumption levels are higher, as they are usually responsible for domestic chores, including laundry and doing the dishes.

2.3.4 Income and Usage Level

The literature shows that the interaction between income level and water conservation behaviour is not straightforward and may depend on other factors (Koop et al., 2019). However, Fielding et al. (2012) illustrate that the profile of a low water use household tends to include fewer people who earn a lower income. This even though higher income households express stronger intentions to install water efficient appliances.

Feedback or tailoring interventions, such as the installation of (smart) metering devices, have been shown to have a more pronounced effect on high income and high usage households (Velez & Moros, 2021). This is corroborated by Daminato et al. (2021) who found that low and high users respond differently to the provision of smart metering. High-use households decreased their water consumption more significantly, compared to lower use households. In fact, below-median consuming households increased their consumption following the installation of water meters. Brick et al. (2023) also studied the effect of income level on water conservation behaviour and found that lower income households did not respond to the interventions in the long or short term. Lower-middle income households were more sensitive to both financial savings (i.e., information on financial gains and losses) and social incentives (i.e., social norms, public good, intrinsic motivation and social recognition). The highest-income households reacted most significantly to the social incentives. From a policy perspective, these findings are very helpful in designing effective interventions. Targeting high-income and high-use households is important in reducing water consumption, especially in a highly unequal society like South Africa, and knowing how to design such interventions effectively is crucial.

2.4 Upscaling Behaviour Change Interventions

The literature illustrates that enhancing water conservation behaviour through behaviour change interventions can be effective and is done by targeting the different mechanisms and 'ingredients' that make up the decision-making processes, whether reflective, semi-reflective or automatic. However, interventions are often limited in scale, short-lived and do not have a lasting impact. Uptake of water conservation behaviour interventions in South Africa has been poor, despite the large number of successful pilot interventions. Upscaling is needed to translate research findings into sustainable impact. Scaling up includes the expanding, adapting, and sustaining of policies, programmes and projects in different places at the same time, to reach a greater number of people, in a quicker and more equitable way, lasting effects (Westermann et al., 2015). This section will elaborate on the strategies and mechanisms used to upscale public health interventions, agricultural programmes, poverty reduction programmes and climate change mitigation interventions. Key lessons on how to develop a scaling-up strategy will be synthesized.

2.4.1 Lessons Learnt from Scaling-Up Efforts in Various Sectors

Efforts to scale up interventions in the public health are increasingly being recorded and operational frameworks on how to scale up health interventions are being developed. These frameworks include information for policy makers and funding agencies on how to scale up an intervention. Most of these frameworks are theoretical, even though they are operationally useful. By characterising the pathways through which public health interventions are scaled up, Indig et al. (2018) were able to develop a conceptual framework which quantifies and describes the upscaling process. Four pathways were identified which capture the different scaling up trajectories of 40 public health interventions in high-income countries. In the first stage, the programme development process and theoretical basis is analysed. The second stage involved testing the program in a controlled setting or conducting a pilot test to evaluate its efficacy. The third stage involves implementing the programme in multiple real-world settings and locations, also known as field testing or replication. The final stage involved disseminating the program at a population level, which includes adapting, institutionalising, or commercialising it. These steps can be used to create a framework to guide the scaling up of behaviour change interventions for the water sector in South Africa.

Westermann et al. (2015) set out to provide insight into the use of different scaling up approaches to scale up research findings for poverty reduction and climate change. They first outline common challenges found when trying to scale up scaling up Climate-Smart Agriculture (CSA) technologies and practices. CSA is an approach to farming that transforms and reorients agricultural systems to support food security in a world that is threatened by

climate change. The first challenge is that of high costs related to reaching large numbers of farmers. To overcome this challenge, the authors recommend introducing CSA into existing structures and partnering with actors who have already achieved scale. These actors need to be powerful enough to set and enforce rules. The purpose is to find the most effective point, where interventions can affect the most change that benefits the largest number of people. The second challenge to overcome is that of costs related to meeting farmers' priorities and making technologies and practices context specific. When interventions are small scale, practitioners have enough time and resources to engage with farmers to establish their needs and priorities, as well as demonstrate the benefits of the intervention. This is especially true for interventions that push beneficiaries to adopt new approaches or technologies, rather than interventions that are demand driven. Lastly, the political, institutional and economic environment can be a challenge to CSA policies and programmes. The existing institutions as well as policy and regulatory frameworks must be assessed to consider the opportunities and constraints they provide. Ideally, the institutional choices and the capacity building that is required should be clear from the start of the scaling up process.

After finalising their analysis of selected case studies of scaled up programmes, Westermann et al. (2015) distinguished three categories of approaches to scaling up CSA policies and programmes. The first approach category is based on value chains and the private sector. Value chains can act as delivery mechanisms by providing a way to link multiple actors around a common objective. They can also provide market driven demand for produce. This approach may not be appropriate for the informal sector or agricultural production for household consumption. There are also concerns regarding addressing gender and equity issues in developing countries. The second approach utilises ICTs and agro-advisory services. This offers a solution to the high costs associated with face-to-face interactions. It also provides a way to access a wealth of information about climate change and CSA strategies and technologies, which is especially salient for female farmers in developing countries. The third approach revolves around policy engagement. Supporting countries in putting in place the appropriate policy, institutional, technical and financial means is essential to scaling up efforts. Meaningful engagement is also necessary to manage competing interests in policymaking.

2.4.2 Conceptual Framework to Develop a Scaling-Up Strategy

Scaling-up strategies refer to the plans and actions required to establish the intervention in policies, programmes and service delivery (World Health Organisation, 2010). Certain strategic choices need to be made when developing a scaling-up strategy, such as the type of scaling up (i.e., vertical, horizontal, diversification and spontaneous scaling up). For each type of scaling up, choices need to be made regarding dissemination and advocacy, organisational process, costs and resource mobilization, and monitoring and evaluation. The

World Health Organisation provides a nine-step process for developing a scaling-up strategy: (1) planning actions to increase the scalability of the innovation, (2) increasing capacity of user organisations to implement scaling-up, (3) assessing the environment and planning actions to increase potential for scaling-up success, (4) increasing the capacity of the resource team to support scaling-up, (5) making strategic choices to support scaling up (institutionalization), (6) making strategic choices to support horizontal scaling up (expansion/replication), (7) determining the role of diversification, (8) planning action to address spontaneous scaling up, and (9) finalising the scaling-up strategy and identifying next steps. Throughout the nine-step process, four key principles need to be kept in mind throughout the analysis, planning and decision-making processes: (1) systems thinking, (2) a focus on sustainability, (3) enhancing scalability, and (4) respect for human rights, equity and gender perspectives.

2.5 Key Lessons and Best Practices

Below is an overview of the key lessons and best practices that have emerged from this literature review. These key lessons and best practices informed the development of a strategy and action plan to increase the uptake and scale of behaviour change interventions for water conservation and water demand management purposes.

Table 1. Key Lessons and Implications for Behaviour Change Intervention Strategies for Water Conservation in South Africa

Key Lesson	Description	Implications for Behaviour Change Intervention Strategies for Water Conservation in South Africa
Consider the mechanisms of behaviour change	<p>Human behaviour can be affected through different information processing routes (i.e., reflective, semi-reflective and automatic). Different types of behaviour change interventions target different aspects and ‘ingredients’ of the decision-making process (Koop et al., 2019).</p> <p>Intention and attitude do not automatically lead to behaviour change. Essiz et al. (2022) explain that even though an individual has strongly held pro-environmental values, or intentions, this often fails to be translated into pro-environmental behaviours. This discrepancy is called the value-action gap, also known as the green attitude-behaviour gap in green consumption</p>	<ul style="list-style-type: none"> • Understanding the behaviour that is targeted for change and the decision-making process that leads to such behaviour needs to be considered carefully when designing and implementation behaviour change interventions. • Targeting the semi-reflective and automatic information processing routes might be more beneficial to increasing water conservation behaviour than targeting the reflective route, since pro-conservation intentions and attitudes do not automatically lead to pro-conservation behaviour change.
Align intervention to the target audience/receiving environment	<p>Developing countries are more constrained in terms of resources and implementation capacity than developed countries. This has implications on the feasibility of certain interventions. Miranda et al. (2020) illustrate how interventions must be designed whilst keeping in mind the technical, institutional and resource restraints of the receiving environment.</p>	<ul style="list-style-type: none"> • Successful interventions may only work within the context of a specific country or target population and may not work when transplanted to a different context without being amended first. • Interventions designed for developing country contexts like South Africa must consider any

	<p>The success of an intervention is partly dependent on a receiving environment's cultural, political and historical context. Timm and Deal (2018) hypothesize that Singapore's unique political context and national culture may have supported the success and acceptance of its water recycling programme.</p>	<p>existing technical, institutional and resource constraints and design ways to mitigate any potential shortfalls.</p> <ul style="list-style-type: none"> • Large households with high income and educational levels should be targeted by water conservation behaviour interventions, since their water use is higher and potential water saving benefits are greater. • Women and young people should be targeted by water conservation behaviour interventions to maximise conservation benefits, since their water use is higher.
<p>Large, high-income, and highly educated households use more water than small, low-income, and lower educated households (Fielding et al.; 2012). The potential for water savings is higher when targeting this group.</p>		
<p>Behaviour change interventions are impacted when they are implemented during water scarce periods, such as droughts (Bernedo et al., 2014; Brick et al., 2023; Visser et al., 2021; Jessoe et al., 2021; Fielding et al., 2013). A drought can be seen as both a driver and a constraint for water conservation interventions, depending on the context and the type of intervention.</p>		
<p>Demographic variables such as gender and age play a determining role in the effect a behaviour change intervention will have. It is generally accepted that older people consume less water and women consume more water than men, at least in the context of South Africa (Fielding et al. 2012; Murwirapachena, 2021)</p>		

Design interventions in a way that maximises impact	<p><i>Tailoring</i> interventions, such as HWRs, are most effective when implemented over a longer period of time with direct and frequent reporting of real-time water use information, through digital means, such as a web or phone application. High-income and high-use households are more significantly affected by water consumption feedback than low-income and low-use households.</p>	<ul style="list-style-type: none"> Interventions should be designed and implemented according to the characteristics of the target audience if maximum impacts should be achieved. Considering the high levels of inequality and cultural diversity in South Africa, different strategies to achieve water consumption behaviour change should be developed to target different groups in society. Consumers can be grouped together according to income and usage level, billed or unbilled consumption, cultural and ethnic groups, demographic variables such as gender and age, geographic locations, rural/urban, etc. This requires implementers to have a solid understanding of the target audience, their needs and motivations, perhaps through the use of surveys. More priming and nudging interventions should be designed and implemented for water conservation purposes. They have distinct advantages as they target behaviour change, rather than attitude change and are not very resource intensive. However, the paternalistic
	<p><i>Social norms and social comparison</i> interventions are more effective when they include injunctive norms with a social comparison aspect that refers to in-group norms, instead of general social norms. Additionally, high-income and high-use households decrease their water use more significantly through social norms interventions.</p>	
	<p>Awareness campaigns and other <i>knowledge transfer</i> interventions can increase the public's knowledge and awareness of water scarcity issues and can promote pro-conservation intentions and attitude. However, knowledge transfer interventions alone are not effective at changing behaviours. Van der Vyver (2016) confirms that South Africans have been exposed to water conservation awareness campaigns, understand the importance of water conservation, and believe that people should use less water. However, the majority does not think they have to change their own</p>	

	<p>behaviour. Knowledge transfer interventions by themselves are, therefore, less suited to achieving behaviour change.</p> <p>Both Cauberghe et al. (2021) and Zhuang et al. (2018) illustrate how the response to <i>framing</i> interventions is highly dependent on the target audience. Cauberghe et al. (2021) showed that women and older respondents were more likely to respond to efforts to frame water as a unique resource, and Zhuang et al. (2018) illustrated how Chinese participants were more likely to respond positively to future-framed messages than their US counterparts, indicating that cultural identity plays a role in the way messages should be framed to be effective.</p> <p>Both <i>primes</i> and <i>nudges</i> are found to be very effective at achieving behaviour change, particularly within the public health sector. Many of these types of interventions are relatively low-cost and can reach a large amount of people. However, these intervention approaches are underutilised for water conservation purposes (Grilli & Curtis, 2021; Koop et al., 2019).</p>	<p>nature of nudges and primes must be considered through a lens of free will.</p>
Integrate different intervention types	<p>The literature illustrates that an integrated approach to reducing water consumption is more effective than implementing one type of interventions at a time. For example, knowledge transfer interventions are only meaningful when</p>	<ul style="list-style-type: none"> • Reflective, semi-reflective and automatic behaviour change interventions should be combined and well-aligned within an overarching behaviour change strategy to achieve long-term

	combined with self-efficacy interventions (Eddo et al., 2019). Tailoring interventions in the form of feedback through smart meters only have a long-term effect if reinforced by repetition and social norm messaging (Koop et al., 2019).	and effective behaviour change and maximise benefits.
Improve long-term effects of interventions	<p>Achieving persistent behaviour change has been a central but elusive goal within water conservation efforts. Some long-term effects have been recorded. However, most interventions do not seem to persist over time. This might also be attributed to the lack of longitudinal studies on the persistence of water conservation behaviour change. Long-term effects have been achieved through a variety of intervention approaches, including appealing to the reflective decision-making process (Vivek et al., 2021), smart-meter based feedback interventions (Cominola et al., 2021)</p> <p>A lack of longitudinal research into the long-term effects of behaviour change interventions prevents researchers and implementers from understanding how to achieve long-term behaviour change (Grilli & Curtis, 2021).</p>	<ul style="list-style-type: none"> • For water conservation interventions and strategies to be effective, both in effort and resources, long-term effects of interventions must be achieved. • Studies on the effectiveness of different behaviour change interventions should focus more on the long-term effects and longitudinal research must be increased. • Define the measure of success and measurement methods when designing an intervention or strategy, to allow for effective and accurate monitoring and evaluation. This includes accurately recording resource inputs.
Scale up water conservation behaviour interventions	Uptake of water conservation behaviour interventions in South Africa has been poor, despite the large number of successful pilot interventions. Upscaling is needed to translate research findings into sustainable impact. Scaling up includes the expanding, adapting, and sustaining of policies, programmes	<ul style="list-style-type: none"> • Before interventions can be up scaled, they need to be tested in terms of efficacy, as well as replication. Upscaling only works when interventions are effective and can be implemented in a wide range of contexts. The

	<p>and projects in different places at the same time, to reach a greater number of people, in a quicker and more equitable way, lasting effects (Westermann et al., 2015).</p>	<p>way interventions need to be amended for them to be replicated should be assessed.</p> <ul style="list-style-type: none"> • The political, economic and institutional environment has to be suitable for upscaling efforts. The existing institutions as well as policy and regulatory frameworks must be assessed to consider the opportunities and constraints they provide. Ideally, the institutional choices and the capacity building that is required should be clear from the start of the scaling up process. • Partnering with powerful actors and using existing structures to implement interventions at scale can provide additional implementation support and resource and cost savings. • An upscaling strategy for water consumption behaviour change interventions in South Africa needs to include equity and gender considerations in its design. • Scalability of behaviour change interventions should be assessed and enhanced. • Monitoring and evaluation should be built into the upscaling framework.
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3 BUILDING BLOCKS OF A SUCCESSFUL BEHAVIOURAL CHANGE STRATEGY

Before a municipality or any implementing agent can devise a plan to use non punitive measures to reduce water consumption, it is imperative to have a strategy in place to ensure the sustainability of the intervention.

The Deming Model of Plan, Do, Check and Act is an excellent tool to guide the development of the behavioural change strategy. The model is systematic and iterative, resulting in structured continuous learning and improvement of the overall intervention. The approach allows the intervention to adapt based on evidence.

Below, is an overview of the Deming Model to be used to assist develop an overarching behavioural change intervention.

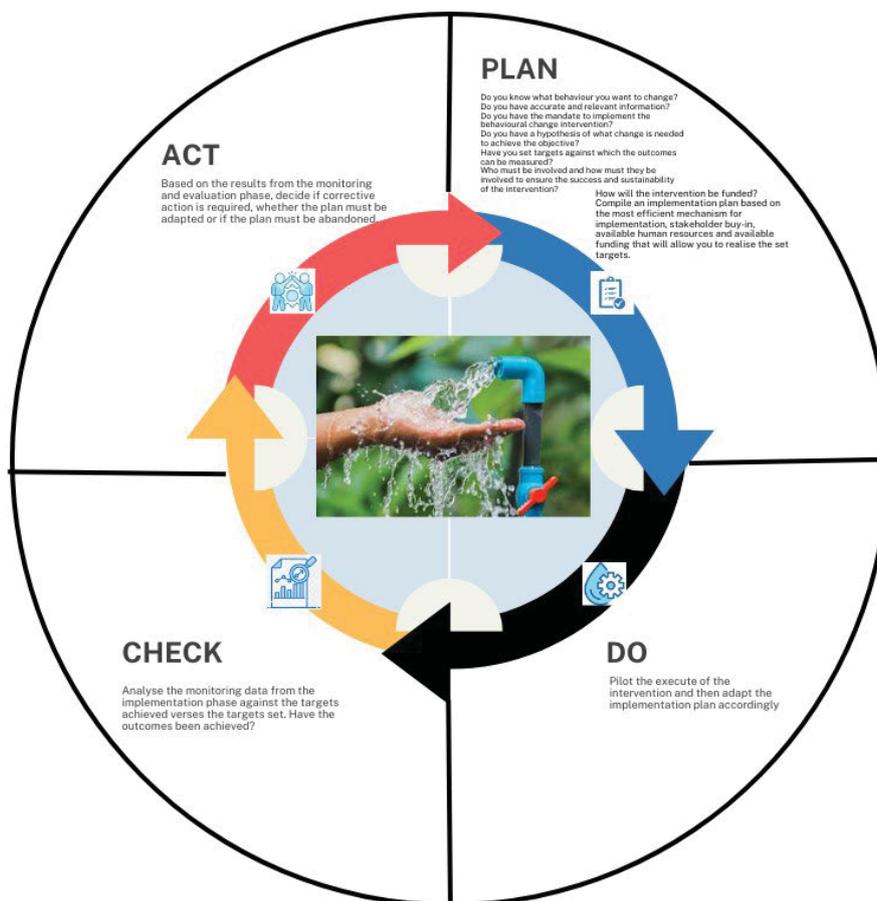


Figure 2 – Deming Model Cycle to Inform Strategy Development

Table 2. Deming Model Approach for a Behavioural Change Strategy

Plan	<p>Do you know what behaviour you want to change? Do you have accurate and relevant information? Do you have the mandate to implement the behavioural change intervention? Do you have a hypothesis of what change is needed to achieve the objective? Have you set targets against which the outcomes can be measured? Who must be involved and how must they be involved to ensure the success and sustainability of the intervention? Have the stakeholders been consulted? Do they share your views? What do they think is the solution? Do they know their role in the intervention, and do they accept this role? Have they agreed to the targets? Did you develop a Theory of Change for the intervention? How will the intervention be funded? Compile an implementation plan based on the most efficient mechanism for implementation, stakeholder buy-in, available human resources and available funding that will allow you to realise the set targets.</p>
Do	Pilot the execute of the intervention and then adapt the implementation plan accordingly
Check	Analyse the monitoring data from the implementation phase against the targets achieved verses the targets set. Have the outcomes been achieved?
Act	Based on the results from the monitoring and evaluation phase, decide if corrective action is required, whether the plan must be adapted or if the plan must be abandoned.

The Chapters to follow assist in the development of a strategy to infuse the uptake and application of behavioural nudges and other behaviour change interventions to reduce water consumption.

4 LEGISLATION, POLICIES AND STRATEGIES IN SUPPORT OF BEHAVIOURAL CHANGE INTERVENTIONS

From the literature reviewed and the feedback from municipalities interviewed, there is consensus that behavioural change interventions including behavioural nudges is best placed within WC/WDM strategies, plans, and interventions which are regulated by a comprehensive legislative and policy framework. Below, is an overview of key legislation, policies and strategies in place governing, and supporting WC/WDM interventions within the water sector of South Africa. The intention of this chapter is understand (1) do you have the mandate to implement a behavioural change intervention (2) where is the most efficient place to house and implement the intervention and (3) what policy and legislative change is needed to implement the intervention?

4.1 International Policies and Agreements pertaining to WC/WDM Interventions in South Africa

In 2015, South Africa, adopted the 2030 Agenda for Sustainable Development Goals (SDG), which provides a shared blueprint outlining 17 SDGs with specific targets and set indicators on how to address and action major goals and strategies to improve the health, education, reduce inequality, poverty and spur economic growth, while also preserving and looking out for the environment. These goals have been integrated within South Africa's National Development Plan (NDP) as well as other plans and policies.

Specifically, SDG 6 which focuses on ensuring the availability and sustainable management of water and sanitation for all. Within SDG 6 there are 8 targets of which target 6.4 and 6.5 directly relate to how technical, pricing, regulatory and behavioural interventions can be used to ensure that water resources are used effectively. Target 6.4 aims to substantially increase water use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity by 2030. A way to measure this target is through the indicators, which identify and measure change in water use efficiency over time as well as the percentage level of water stress. Target 6.5 on the other hand aims to implement integrated water resource management at all levels including through transboundary cooperation as appropriate by 2030 (United Nations, 2023). According to the SDG Country Report of 2023, the degree of integrated water resource management in South Africa increased from 70% in 2019, to 72.5% in 2020, indicating an improvement in the holistic and coordinated approach to managing water resources in the country (Stats SA, 2023). SDG 13, focuses on Climate Change, with target 13.3 specifically highlighting areas where WC/WDM can be implemented, specifically

stating that the target by 2030 is to improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation impact reduction and early warning (United Nations, 2023).

The goals provide universal targets and indicators for the sustainable management and use of water resources which cannot be achieved in South Africa without consideration of fundamental behaviour change interventions.

4.2 South African National Legislation Regulating WC/WDM Interventions

The Water Sector of South Africa can be divided into two main subsectors, namely the water resource management sector, which is regulated by the National Water Act (No. 36 of 1998) and the water service sector which is regulated by the Water Services Act (No. 108 of 1997). Below is a summary of the key Acts guiding the water sector in South Africa in terms of WC/WDM.

Table 3: Key Legislation regulating WC/WDM in South Africa

<p>The Water Services (No. 108 of 1997)</p>	<p>The Act provides the right of access to basic water supply and sanitation to all citizens of South Africa. The Act stipulates that all spheres of government must provide water supply services in an efficient, equitable and sustainable manner and requires municipalities that have been given the Water Services Authority and/or Provider status to establish measures to promote WC/WDM which should be included in the development of their WC/WDM strategy as well as their business plans and WSDP.</p> <p>Specifically, the Act requires municipalities to develop conditions for the provision of water services that includes water conservation, recycling and environmental protection measures in their WSDP and WC/WDM strategy. Section 9 of the Act makes provision for the Minister to prescribe compulsory national standards relating to the effective and sustainable use of water resources for water services, and the nature, operation, sustainability, operational efficiency and economic viability of water services. The Act also makes provision for the Minister to prescribe WC/WDM measures to be taken by water services authorities, as well as prosecute anyone who continues the wasteful use of water after being called upon to stop. This creates the framework for municipalities to regulate water consumption in a way that benefits all.</p>
<p>The National Water (No. 36 of 1998)</p>	<p>The Act affirms the responsibility of the National Government, acting through the Minister, to “ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable</p>

manner, for the benefit of all persons and in accordance with its constitutional mandate". The Act requires that a National Water Resource Strategy (NWRS) is established that includes strategies, objectives and guidelines related to the protection, use, development, conservation, management and control of water resources. Government is obliged to conserve and protect water and to ensure that water users do not waste water. It is the main legal framework for the efficient management of water resources.

In addition, within this Act there is a requirement of the Minister of Water and Sanitation to provide funding for WC/WDM strategies.

4.3 National Strategies guiding WC/WDM in South Africa

4.3.1 Strategic Framework for Water Services 2003

The Strategic Framework for Water Services (SFWS), approved by the Cabinet in 2003, aimed to provide a comprehensive approach to water services across the country. The framework was part of the broader effort to improve water services and sanitation in both rural and urban areas, aligning with the goals of the Reconstruction and Development Programme initiated in 1994. The SFWS suggests that the accountability of water services providers must be improved and WC/WDM measures should be implemented to enhance efficient water use. The SFWS deemed it necessary for water services institutions to develop an appropriate and comprehensive WC/WDM strategy, to be included in their water services development plans to minimise water losses and promote water demand management among consumers. Moreover, the SFWS states that municipalities should ensure that accurate data on water services provision is available to facilitate planning for future water needs.

4.3.2 National Water Resource Strategy

In 2004 the first edition of the National Water Resource Strategy (NWRS) was published. The NWRS is the legal instrument for operationalising the National Water Act and is considered the primary mechanism to manage water across all sectors of South Africa.

Currently, the NWRS is in its third edition. It responds and aligns to South Africa's NDP Vision of 2030 as well as the SDGs and outlines how South Africa will achieve the following overarching goals:

1. Water must be protected, used, developed, conserved, managed and controlled sustainably and equitably;
2. Water and sanitation must support development and eliminate poverty and inequality;
and

3. Water and sanitation must contribute to the economy and job creation.

The NWRS-III emphasises the importance of reducing water losses and increasing water efficiency, particularly through the implementation of WC/WDM measures.

Specifically, the NWRS-III provides a strategic approach to optimising the use of water resources by focusing on three development issues, namely: (1) economic efficiency; (2) ecological sustainability; and (3) social equity. Outlined within this strategic approach is eight generic objectives each focusing on different ways to optimise the use of water resources, with objectives 2, 3 and 4 specifically targeting the use of WC/WDM strategies and how it can be used to optimise water resources within the water sector.

Strategic objective 2, aims to raise the importance and need for change of attitude and behaviour in terms of how water is treated and conserved through education and awareness programmes. Similarly, objectives 3 and 4 aim to create a culture of WC/WDM for all consumers and users and within all water management and water services institutions. Within these objectives are set outputs and indicators on how to meet the objectives, for example to meet objectives 3 and 4, awareness campaigns, educational programmes and workshops will be used to influence behaviour patterns, target and create a WC/WDM culture.

4.3.3 National Water Conservation and Water Demand Management Strategy

In 2004, the then DWAF, now known as the DWS developed a National Water Conservation, Water Demand Management Strategy (NWC/WDMS) which outlines the principles and objectives for WC/WDM in South Africa. The NWC/NWDMS is informed by the NWRS. The NWC/WDMS promotes water use efficiency and supports the implementation of the National Water Act and the Water Services Act by providing the framework for integrating WC/WDM into water management practices. The NWC/WDMS is centred around 8 key objectives namely:

1. To facilitate and ensure the role of WC/WDM in achieving sustainable, efficient and affordable management of water resources and water services;
2. To contribute to the protection of the environment, ecology and water resources;
3. To create a culture of WC/WDM within all water management and water services institutions;
4. To create a culture of WC/WDM for all consumers and users;
5. To support water management and water services institutions to implement WC/WDM;
6. To promote the allocation of adequate capacity and resources by water institutions to WC/WDM;

7. To enable water management and water services institutions to adopt integrated planning; and
8. To promote international cooperation and participate with other Southern African countries, particular basin-sharing countries in developing joint WC/WDM strategies.

The inclusion of social awareness and advocacy programmes in a WC/WDM strategy is considered a strategic objective and action that can influence behaviour and attitudes change towards water management .

4.3.4 The National Water and Sanitation Master Plan

The National Water and Sanitation Master Plan (NW&SMP) was introduced by the DWS in November 2019 with the intention of providing water sector stakeholders with a guide to investment planning for the development of water resources and the delivery of water and sanitation services. While the plan identifies WC/WDM initiatives as key to reducing water consumption and elevating water security, it does not outline key activities, strategies or timelines on how to achieve and implement these initiatives. Rather, WC/WDM initiatives are encouraged within the plan as a key strategy that would help visualise and reach the overall goal of providing access to water for all, while conserving and protecting water resources.

4.4 Other Relevant Legislation

Below, is an overview of other key legislations that has a potential impact on WC/WDM strategies.

Table 4: Other Key Legislation related to WC/WDM Strategies

<p>The Conservation of Agricultural Resources Act (CARA) (No. 43 of 1983)</p>	<p>The Act speaks to resource efficiency within the agricultural sector of South Africa and can be seen as playing a key role in regulating WC/WDM in South Africa as within this Act there are key provisions that can be directly linked to and used to enhance WC/WDM initiatives. The Act therefore:</p> <ol style="list-style-type: none"> 1. Mandates to prevent soil erosion as healthy soils are better at retaining water reducing need for irrigation; 2. Promotes maintenance of vegetation cover; 3. Encourages the adoption of efficient irrigation practices to minimize water wastage; 4. Supports practices that enhance water harvesting and storage; and 5. Farmers are required to develop and implement land management plans that include WC/WDM measures
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	<p>This Act can therefore be seen as complimenting WC/WDM initiatives, specifically within the agricultural sector of South Africa, a key water user.</p>
<p>The National Environmental Management Act (NEMA) (Act 107 of 1998)</p>	<p>The Act plays a significant role in regulating WC/WDM in South Africa as it sets out an environmental governance framework which seeks to promote environmental management principles. Specifically, NEMA emphasises the integration of social economic and environmental factors into planning and decision-making processes to ensure sustainable development, a principle that supports WC/WDM initiatives through promoting the efficient and sustainable use of water resources. In addition, in line with the goals of WC/WDM to conserve and ensure the sustainable use of water within the country, within NEMA, principles for environmental management are provided, some of which include the prevention of pollution, ecological degradation and the promotion of conservation and the sustainable use of natural resources. Further to this, the Act imposes a duty of care on individuals and organisations to prevent environmental harm and to take reasonable measures to prevent pollution and manage resources responsibly, all of which is essential for effective WC/WDM practices.</p>
<p>Municipal Structures Act (No. 117 of 1998) (Structures Act)</p>	<p>The Structures Act provides for the establishment of municipalities and the divisions of functions and powers between categories of municipalities. Municipalities are required to review the needs of the community, its priorities to meet these needs, processes for involving the community, organisational and delivery mechanisms for meeting the needs and its overall performance in achieving objectives.</p>
<p>Municipal Systems Act (No. 32 of 2000) (Systems Act)</p>	<p>The Systems Act provides for the core principles, framework and procedures to enable municipalities to uplift their communities and guarantee affordable universal access to basic services. Informative billing is a requirement under the Systems Act, as well as accurate measuring of consumer consumption. The Systems Act also stipulates that municipalities are obliged to provide community members with accurate and complete information on the standard of services that are provided (Sect. 6(2)(f)).</p>
<p>Municipal Bylaws</p>	<p>Chapter III of the Water Services Act (No 108 of 1997) stipulates that all Water Services Authorities (WSA) must compile bylaws which include conditions for the provision of water services. This creates the framework for WSA's to regulate water consumption in a way that benefits all. In a policy and legal environment where behavioural change is ignored, municipal bylaws provides the opportunity for municipalities to develop and</p>

implement behavioural change objectives that meet their requirements for guiding and/or regulating water uses and users.

From the above it is clear that WC/WDM is sufficiently addressed in South African law meaning that behavioural change interventions are supported within the existing policy and legal framework in the country. Municipalities have a clear mandate to protect and conserve water and to undertake and promote WC/WDM activities. However, while many of these legislations, policies and strategies outline specific objectives and targets as to going about conserving and managing water resources there is a lack of in-depth information and targets on how to go about achieving as well as funding these initiatives. Further to this, there is little to no guidance on how to incorporate behavioural interventions into the current legal framework, suggesting that the Strategy to Infuse the Uptake and Application of Behavioural Nudges is necessary to fill the current gap in the policy landscape.

5 KEY ROLE-PLAYERS NECESSARY FOR THE OPERATIONALISATION AND REALISATION OF THE STRATEGY

Below, is an overview of the key water sector roleplayers that are instrumental in the uptake and application of behavioural nudges and associated behaviour change interventions. These are stakeholders that are critical to the success of the intervention. It is vital to understand their roles, what their input should be and how to gain their trust and buy-in.

5.1 Who are the Key Stakeholders?

At a National level DWS is the custodian of South Africa's water resources. The Department is mandated to promote effective and efficient water resource management to ensure sustainable economic and social development. DWS is responsible for the formulation and implementation of policies governing the water sector. National Treasury is essential in providing the budgetary support to implement water related policies.

Irrigated agriculture and water use for domestic purposes are one of the biggest water uses. This is followed by the industrial, mining, afforestation, power generation and mining sectors, all of whom need and use water in order to develop, function and contribute to economic development.

Some key departments within government that regulate water supply within these sectors include:

- The Department of Human Settlements – for creating sustainable human settlements and improving the quality of life for all households, a function that requires the availability and access to water in order to realise this goal.
- The Department of Health – deals with prevention of illness, diseases and the promotion of healthy lifestyles.
- The Department of Agriculture, Land Reform and Rural Development - responsible for providing citizens with equitable access to land, integrated rural development, sustainable agriculture and food security for all.
- The Department of Mineral Resources – mandated to transform and to sustainably develop and growth the mining sector.
- The Department of Public Works and Infrastructure – responsible for economic and social development and the transformation of the built environment.

- The Department of Cooperative Governance and Traditional Affairs – ensures the efficient and effective cooperation of governance systems. Specifically, it supports integrated planning and implementation across all spheres of government.
- Department of Basic Education and the Department of Higher Education and Training – responsible for providing access to learning and training facilities.

While all these government departments may not be directly involved and active in the water sector, they need water to realise their visions, mandates and commitments. Their buy-in is essential in raising awareness of any behavioural change interventions.

The following regional roleplayers are key in the development and implementation of WC/WDM strategies and interventions:

- Catchment management agencies (CMA) are responsible for water resource management at a catchment level. Where CMAs are not established, national government undertakes the management functions through DWS regional offices. There are 9 established CMAs in the country.
- Water Boards provide water services to other water services institutions within their respective service areas.
- Regional water utilities manage regional water resources as well as regional bulk and wastewater infrastructure in terms of a mandate from DWS.
- Regional Water and Sanitation Forums are established through the Catchment Management Forums and provide spaces for civic engagement on water governance issues.

At a local level, the following key roleplayers are seen as key in the development and implementation of WC/WDM strategies and interventions:

- Water Service Authorities (WSA) which are responsible for ensuring the provision of water services within their area of jurisdiction regulated by the Department of Cooperative Governance and Traditional Affairs.
- Water Services Provider (WSP) can be public, private mixed entities or municipal government that provide water or sanitation services for municipalities and perform contractual duties as specified by the WSA.
- Water user associations are co-operative associations of individual water users who wish to undertake water related activities for the mutual benefit on a local level.

While these stakeholders have varying responsibilities in the provision of water and access to water services to the citizenry, the consumer has an equally importance role in using the resource within the confines of the rules set out by the municipality.

Research institutes and universities inform the foundation of our knowledge base across various fields and topics and drive innovation, knowledge sharing, advocacy and awareness. Specifically, within the water sector of South Africa, they play a key role in the collection of data and information and in many cases, this information and research accumulated and researched by these institutions can inform policy development and assist in the development of new technologies to ensure the sustainable water management within the water sectors of South Africa. Some of the most notable research institutions that are actively driving behavioural economic change in the water sector include:

- **Water Research Commission (WRC)** – lead research institution dedicated to water research and development within South Africa.
- **The Council for Scientific and Industrial Research** – has a specific Water Research Centre that focuses on the development and refinement of smart water use and infrastructure technologies.
- **Water Institute of Southern Africa** – forum that brings together various disciplines to discuss and plan for sustainable water management in a region.
- **Centre for Water and Sanitation Research** is located at the Cape Peninsula University of Technology and focuses on research topics related to water and wastewater treatment technologies.
- **Institute for Water Research** located at Rhodes University is dedicated to the study and management of water resources.
- **Institute for Water and Wastewater Technology** based at Durban University of Technology conducts research on water and wastewater treatment technologies.
- **International Water Management Institute** is a research institute for development organisation and although it is an international institution, they have a significant presence in South Africa. They have an office based in Pretoria and it coordinates efforts to address regional and national water management challenges. It also includes the implementation of three strategic programmes focused on water resource management.

Other key stakeholders that play a pivotal role in the uptake of behavioural nudges and associated behaviour change tools include:

- **South African Local Government Association (SALGA)** – Although SALGA is not directly involved in water management or water policies and legislation, it is an autonomous association of all 257 South African local governments and is responsible for local government oversight. The aim of SALGA is to ensure that local governments work together to achieve and realise the goals set out by government. In May 2008,

SALGA drafted a Framework for WC/WDM for local municipalities to use as a standardised guideline in developing their own strategies (SALGA, 2008).

- **Southern African Development Community (SADC)** – an intergovernmental organisation focused on promoting economic growth, peace and security throughout South Africa. As part of this vision SADC has implemented various WC/WDM policies and strategies, for example the Regional Strategic Action Plan on Integrated Water Resources Development and Management Phase V, which aims to guide the management and development of regional water resources and promotes WC/WDM strategies (SADC, 2023).
- **Civil Society** – civil society plays a crucial role in maintaining water security and efficiency within the water sector through advocating for water security, shaping public preferences to water security; raising awareness in communities on water wise strategies; creating platforms to share knowledge; taking independent actions to inform wider practices; engaging community based organisations to manage and assist in water service projects; playing an integrative or mediating role between government and community; and supporting the development of policies, research and assist in planning and implementing key strategies within communities government departments cannot reach.
- **Public Private Partnerships** – there is growing consensus that to ensure the sustainability of water throughout the world, it is important to foster partnerships between government and the private sector. These partnerships can aid in WC/WDM initiatives by providing funding, idea sharing, discussion platforms, programme developments and capacity building.
- **Strategic Water Partnership Network** - group of private sector companies working together with DWS, Civil Society Organisations and municipalities to develop and implement programmes to reduce the water demand-supply gap (SWPN, 2020).
- **Municipal Infrastructure Support Agent** – a national government support mechanism for the development of municipal infrastructure.
- **Global Water Partnership** – an international network committed to managing water resources all around the world. It provides technical support, capacity building and policy advice with local and regional partners to promote water resource management.
- **United States Agency for International Development** – funds and supports water projects in South Africa.
- **European Union** – has historically funded water management practices in the country.

- **German Agency for International Cooperation** – collaborates with South Africa institutions, mainly municipalities to implement WC/WDM strategies by funding technical expertise and the implementation of various water management projects.
- **United Nations Development Programme** – supports various water management projects in South Africa.
- **World Bank** – provides funding and technical assistance for water management projects.

These stakeholders play a crucial role in the development and implementation of WC/WDM strategies in South Africa. They have provided global and national expertise, knowledge sharing and capacity development, as well as funding and supporting key South African institutions in their implementation of WC/WDM strategies.

5.2 Why Working with Stakeholders is Crucial?

To effect change through non punitive actions such as behaviour change mechanisms, is not only very difficult but also takes a very long time hence many implementing agents either change course midway through the strategy or give up and move onto more instructive and punitive measures. Therefore, to realise the benefits of behavioural nudges as a change intervention to curtail water use and demand it is essential for stakeholders to collaborate in a meaningful way. The reason for the water sector collaborating is crucial for several reasons namely:

- **Integrated Solutions:** To change a person's actions of convenience is complex and interconnected especially water use. The involvement of key stakeholders on the supply and demand side is more likely to result in sustainable solutions. Each stakeholder brings a different perspective, experience, need and skill therefore a comprehensive solution that addresses multiple aspects of water management can be developed.
- **Co-funding:** Different stakeholders may have access to different pots of money. Collaboration allows for the pooling of these resources, leading to more efficient and effective water management practices.
- **Conflict Resolution:** Water resources are often shared among different users, leading to potential conflicts. Collaboration fosters dialogue and cooperation, helping to resolve disputes and ensure equitable distribution of water. This may help in balancing the potential conflicts of economic development verses environmental conservation and low income verses high income users which are some of the perceived reasons for the overuse of the resource.

- **Knowledge Sharing and Dissemination of Information:** Stakeholders from various sectors may have undertaken various behaviour change interventions and can therefore contribute corrective actions and innovative ideas to improve water management. Also, lessons learned and shared from the implementation of different change management projects will increase the sustainability and the affordability of WC/WDM interventions.
- **Policy Development:** Effective interventions are reliant on sound policies and regulations. Stakeholder collaboration will ensure that behavioural change policies are well-informed, inclusive, and reflective of the needs and priorities of all parties involved.
- **Extended Reach:** Involving all stakeholders will ensure that the message of change reaches a wider audience. More communities can be involved in managing their water uses hence empowering them in ensuring that their needs and concerns are addressed. This leads to greater acceptance and support for behavioural change initiatives.

Working together is more likely to result in a resilient and sustainable water sector that benefits everyone.

5.3 How to Engage with Communities

Involving communities in the design and implementation of behavioural change interventions including nudges to reduce water use is crucial for the success of the intervention. There are various ways of involving communities and users however the most successful revolve around meaningful and transparent strategies. Community involvement in the design and implementation of the intervention is often one of the most cost effective ways of bringing about change.

Community Workshops and Focus Groups: Organize workshops and focus groups to gather input from community members. This helps in understanding their perspectives, challenges, and suggestions for water conservation.

Participatory Design: Engage community members in the co-creation of nudges. This can include brainstorming sessions, pilot testing, and feedback loops to ensure the nudges are relevant and acceptable.

Local Champions and Influencers: Identify and involve local champions or influencers who can advocate for the intervention. Their endorsement can increase the credibility and acceptance of the nudges.

Feedback Mechanisms: Establish mechanisms for ongoing feedback from the community is crucial. This can include surveys, suggestion boxes, and community meetings to continuously improve the interventions and maintain trust and respect for the effort made by the community. Maintain transparency in the design and implementation process. Regularly communicate the goals, progress, and outcomes of the interventions to the community

Collaborative Partnerships: Form partnerships with local organisations, schools, and businesses to support the implementation of nudges. Collaborative efforts can amplify the impact and reach of the intervention.

Community involvement is essential for the long term acceptance and success of the intervention.

6 PLANNING & IMPLEMENTATION FRAMEWORK

Upscaling behavioural nudges and other behavioural interventions in the context of WC/WDM requires a structured approach to ensure that the intervention remains effective across a larger population and throughout diverse settings. Careful planning is therefore essential to improve the uptake and national scaling of behaviour change interventions.

6.1 How to Plan at a Local Level

The policy framework in South Africa is both conducive and supportive of just and fair behavioural change interventions to manage water uses and users. Municipalities are required to develop a WC/WDM strategy based on local needs. The WC/WDM Strategy is the overarching guide for managing water use and demand. In the absence of a WC/WDM Strategy, municipalities can reduce water losses and increase water security through the Water Services Development Plan (WSDP). Although the primary focus of the WSDP is on water service provision, water demand management and waste water treatment, the document provides the context, background and necessary information to uniquely address and implement appropriate behavioural change interventions including behavioural nudges.

Another planning document closely aligned with the WSDP is the IDP which ensures that water service planning is executed in a structured manner based on information and knowledge. It is the principal strategic planning instrument that guides the development at local government level in multiple different spheres on key issues, one being water service infrastructure and developmental needs for sustainable water use and services. The IDP provides a comprehensive framework on how municipalities should work towards their goals, therefore by incorporating behavioural nudges and other change interventions targets into the IDP targets, municipalities are accountable for planning and developing appropriate measures and allocating resources to support these interventions.

To improve accountability and to ensure the implementation, behavioural change targets could be included in the Annual Performance Plans of Managers although this approach may be considered punitive and may not always have the desired outcome if there is no buy in from the individuals involved.

These are some of the key planning tools that can be used for upscaling behavioural nudges as they outline the context, goal, vision, strategy, budget, financial support and resources needed and required for the implementation and sustainability of WC/WDM interventions.

6.2 How to Plan for Behavioural Nudges and Other Behavioural Change Interventions

Proper planning allows municipalities and other implementing agents to improve the impact, sustainability and scale of an intervention and it improves the design and development of future initiatives. Moreover, it allows implementers to expand, adapt and sustain interventions to benefit more people, which is the goal of (national) scaling. Very often behavioural change interventions are found to be effective when implemented in a specific area and at a small scale. However, the challenge lies with scaling up such interventions and implementing them in a different context. Planning an intervention with scalability in mind will make the scaling up process easier and more successful. Scaling up activities should happen throughout the planning process.

Figure 1 outlines the planning process, from scoping to evaluating interventions. It is important that continuous validation takes place throughout the process. Guidance is given on key considerations that can improve the scalability of behavioural change interventions. The approach discussed below is informed by the 2010 World Health Organization’s nine steps for developing a scaling-up strategy.

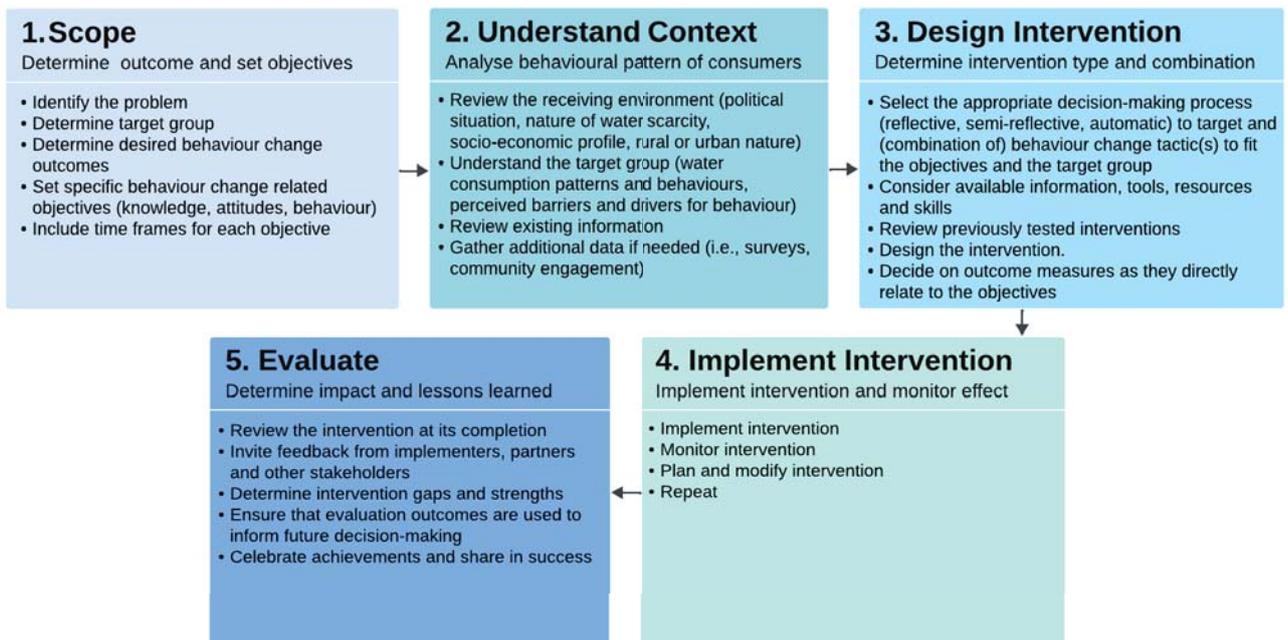


Figure 3. Intervention Planning Process

6.2.1 Scope

The first step to designing an effective behavioural change intervention is identifying the problem you want to address. Water scarcity is caused by a multitude of factors related to

consumer behaviour. The problem in an affluent area might be the practice of watering gardens in the middle of the day and not covering pools, or the lack of adoption of water saving practices and devices, such as rainwater harvesting and installation of water saving devices. However, in lower-income areas, high-levels of water usage are more likely to be attributed to the underreporting of burst pipes and leaks. In South Africa, where non-revenue water levels are high, looking at the water balance and other available information on the nature of water scarcity in the area is a good place to start.

Picking the right behaviour or problem is the first step in a successful scale up process. The behaviour can be tested by asking key questions, such as ‘will there be significant consequences if people do not save water?’, ‘is water saving a common behaviour?’, ‘are other stakeholders also trying to change this specific behaviour?’, ‘will it be easy to change this behaviour?’, and ‘do we have the capacity and interest to target this specific behaviour?’. By asking these questions at the scoping stage, implementers can be sure that they have made an informed decision regarding which behaviour to target which will support scaling efforts.

It is also crucial to carefully consider the group that will be targeted by the intervention. There is no one-size-fits all intervention that will be effective for all groups in society and different messages and types of interventions will have an impact on different target groups. For example, groups that lack knowledge on water conservation respond better to educational campaigns, whereas highly educated users may be more susceptible to interventions that highlight environmental concerns. Moreover, South Africa is a highly unequal society. Equitable water governance is at the heart of sustainable development and one of the aims of water demand management in South Africa is the social equity of water supply. Some argue that high-income users should be targeted, as they consume a lot of water and have the means to invest in water saving devices. Others, especially those that stay in areas with high levels of non-revenue water, argue that indigent users should be influenced to use less water since they do not pay for their consumption. In the context of South Africa, it is worthwhile to consider whether the strongest shoulders should carry the heaviest water conservation burden. Political support is an important prerequisite to making these kinds of decisions.

Once the problem and the target group have been identified, the desired behavioural outcomes can be determined. Behavioural outcomes are overt behaviours that are achieved as a result or as a consequence of a specific intervention, activity or action put in place and that can be seen directly and are centred around actions, such as timeously reporting burst pipes, closing the tap when brushing your teeth, investing in water saving appliances, and covering your pool on hot days.

The are three key target areas that can lead to a change in the water consumption behaviour of users, namely (1) *knowledge*, (2) *attitudes* and (3) *behaviour*. A change in knowledge and attitude can lead to behaviour change and has a direct connection to behaviour over time.

Table 5: Target areas that can lead to a change in consumer behaviour

Target Area	Description	Example of how behaviour changed (behavioural outcome)
Knowledge on WC/WDM	The level of knowledge on water conservation practices a participant has gained by taking part in the intervention.	Immediately after hearing a radio advertising campaign, the target consumer will be able to identify at least three ways to reduce their water consumption in their home. This improved knowledge is likely to be maintained six weeks after the end of the campaign.
Attitude towards WC/WDM	The attitude of consumers towards water conservation needs and practices.	Immediately after participating in an educational programme on water conservation in school, learners will demonstrate an improved attitude towards water conservation practices.
Behaviour towards WC/WDM	The change in behaviour that is exhibited by participants through taking part in the intervention	At least one month after the appointment of realtime water metering, household water consumption in the designated area shows a decrease of at least 5%.

Many interventions designed to effect behaviour change do not have observable, quantifiable and measurable objectives that are related to a specific behaviour for a particular target group. Instead, overall behavioural and communication objectives are defined. If behaviour change related objectives are not defined, the intervention runs the risk of drifting, and the wrong things may be measured in evaluations. This limits the ability of implementers to improve the intervention, rather than just design the next intervention that seems like a good idea. It also allows implementers to work on maintaining and scaling up behaviour change that has been successful. It is also essential to include timeframes for each objective. Behaviour change unlike technical interventions are often difficult to measure and it takes a long time to quantify the impact of the intervention. Therefore, it is essential to understand these complexities before setting timeframes for each objective.

Often self-reported data, such as a change in attitude towards water conservation and self-reported changes water conservation behaviour is more effective as it is non-judgemental and

less instructive. However, there is a lack of trust in self reported data which is considered unreliable and of limited use to the continuous improvement and possible scaling of interventions. This is a perception that needs to be changed as behaviour nudges is about trust and non-punitive actions.

6.2.2 Understand the Context

Gaining a solid understanding of the receiving environment and target group is crucial for the effective design of the behavioural change intervention. South Africa is a geographically and culturally diverse country, ranging from sparsely inhabited rural areas to sprawling and densely populated metropolitan areas. What works in one community might not work in the rest of the country. Interventions do not exist in a vacuum and copying interventions and implementing them in a different environment will likely not garner the same results. This is why the receiving environment must be considered and thoroughly understood when designing an intervention.

Taking into consideration the political environment is important when designing an intervention. Political stability is essential to creating an environment that is conducive and receptive to behaviour change interventions. It fosters a sense of goodwill and trust in government amongst consumers, making it easier for politicians to implement unpopular but necessary interventions. It also enables political leadership to consider long-term impacts and interventions and provide continued financial and institutional support. The cause of water scarcity should also be thoroughly understood. Consumers that live in areas that suffer from reticulation system issues and high levels of non-revenue water are less willing to partake in voluntary water conservation activities than consumers that live in areas where water scarcity is related to natural factors, such as droughts. The socio-economic profile of the consumer that is targeted, as well as the rural or urban nature of the area they are living in, will also play a role in the way they can be reached and their susceptibility to certain interventions and messages.

Having a clear picture of the water consumption patterns of the specific group that is being targeted, as well as understanding their needs, wants and perceptions, assists municipalities with designing an effective intervention. Determining the *perceived drivers* and *perceived barriers* of the target group can be useful create a more focussed method and intervention that is more likely to hit the mark.

- Perceived drivers are those aspects that drive someone to behave in a specific way (i.e., the joy experienced when watering a garden, or the belief that one's water consumption does not have a significant impact on the system).

- Perceived barriers are those aspects that discourage someone from behaving in a specific way (i.e., the guilt experienced when watering one's garden, or the knowledge that water will be restricted if usage levels do not go down).

When the perceived barrier outweighs the perceived driver, a change in behaviour is not likely. Implementers can influence behaviour by introducing new drivers (i.e., the belief that the value of one's house will increase after the installation of a rainwater tank, or newly acquired knowledge on how to conserve water in your house) and minimising the perceived barriers. Unless the thought process behind behaviour is assessed and understood, the intervention might miss its mark entirely.

Reviewing existing information is a good place to start, when trying to understand the environment and target group. Conducting new research is recommended, if needed, to identify the perceived drivers and barriers of the target group and to better understand what is needed to change their existing behaviour. Surveys and public meetings are good ways of engaging with the target group and collecting new information on their needs, wants and perceptions.

6.2.3 Design Intervention

Behavioural interventions that are designed in a systematic and thoughtful way, not only improves the implementation of the intervention resulting in maximised impact, it also allows the implementer to collect meaning data against which the outcomes can be evaluated. This overall benefit improves the existing interventions, and it will result in the optimisation of the design of new behavioural change interventions. Implementers that plan in this way are more likely to gather information from a variety of sources and factor in the required human and financial resources. The design of the intervention must include specific and measurable objectives for the appropriate context and select the best type of intervention to achieve the outcomes based on evidence and the experiences of others. The processes and tactics outlined below can be used to make an informed decision and design an effective intervention.

It is important that to **select feasible interventions**. If an intervention is not feasible, it will not have potential for impact at scale. This increases the likelihood of planned interventions that work well in theory but fail to work in practice, at least at a significant scale. To determine whether the intervention is feasible, ask the following questions: 'is the intervention within budget?', 'can the intervention be implemented as intended?', 'will the intervention be cost-effective?', 'will the intervention be accepted by the relevant stakeholders?', 'are there any foreseeable side-effects or unintended consequences?', and 'will the intervention reduce or increase existing inequalities between different groups in society?'.

When designing behavioural change interventions, it is necessary to distinguish between three distinct decision-making processes (i.e., reflective, semi-reflective and automatic) and eight behaviour change tactics: Interventions that target reflective decision-making processes are (1) *knowledge transfer* and (2) *increasing self-efficacy*. Interventions that work through the semi-reflective route of information processing are (3) *social norms*, (4) *framing*, and (5) *tailoring*. The automatic route includes interventions that target subconscious decision-making processes through (6) *emotional shortcuts*, (7) *priming* and (8) *nudging* (Koop et al., 2018). Implementers should select a behaviour change tactic or combination of tactics that is best suited to the objectives and the target group’s perceived drivers and barriers.

Table 6: Behaviour Change Tactics

Behaviour Change Tactic	Description	Example Relevant to Water Conservation
Knowledge Transfer (reflective)	The more knowledge a person has about an issue, the more likely they are to augment their behaviour.	Education and awareness campaign that teach individuals the necessity and importance of conserving water.
Increasing Self-Efficacy (reflective)	Individuals are more likely to change their behaviour if they are empowered to perform a specific behaviour through increased confidence and skill.	Including practical tips and strategies on how to conserve water to reduce the water bill.
Social Norms (semi-reflective)	Individuals are likely to bring their behaviour into conformity with their peers, once confronted with information that describes their behaviour in relation to the behaviour of their peers. Norms can be <i>descriptive</i> (simply describing the behaviour of others) or <i>injunctive</i> (convey social approval/disapproval).	Public awareness campaigns on the usage level of different geographical areas and how they compare. For instance, in South Africa the average water usage consumption is 233 l/c/d, while the international average is 173 l/c/d. Further to this, in Gauteng the average use is 305 l/c/d. while in Limpopo it is 182 l/c/d.
Framing (semi-reflective)	The way a message is framed by selecting and emphasising specific aspects of the message changes its meaning, and influences how individuals interpret and	Framing water as a unique natural resource, rather than a basic need, to increase the value individuals attach to water

	respond to it, based on their perspective and characteristics.	and the concern they have for its scarcity.
Tailoring (semi-reflective)	Individualising or tailoring a message to address the individual's perspective and characteristics maximises its impact and effect.	Using smart meters to provide individualised and real-time feedback on water use, which allows consumers to be better informed about the amount of water they use and for which activities.
Using Emotional Shortcuts (automatic)	When an emotional response is evoked through emotional shortcuts, individuals are more likely to pay attention to a message and act accordingly. This includes the use of fear, humour, and games.	Social media campaign that use images of people queuing for water to warn what will happen if water is not conserved.
Priming (automatic)	Exposing individuals to stimuli that activate certain unconscious associations or schemas in their minds creates a favourable context for the desired action and increases the salience of the benefits or costs associated with the behaviour change.	Priming consumers with words like 'achievement', 'prevail' and 'accomplish' when communicating about water conservation will empower them to change and/or act on the advice.
Nudges (automatic)	Changing the choice architecture, or set of potential choices available to an individual, by making the preferred option more convenient without judgement or punitive actions.	Installing timers in showers that change colour from green to red when a specific amount of time has passed. The installation of real time feedback on water use will make users aware of their actions and nudge them into action.

Designing the optimal behavioural change/nudge intervention will greatly increase the likelihood of an intervention being scaled. Amending an existing tool or even using previous interventions as a tool to design a new intervention will help in designing interventions, as the wheel does not have to be invented twice. It is rarely the case that an intervention is not (loosely) based on a previously implemented intervention. It is worthwhile reviewing the

context in which the intervention was previously implemented, try to identify the mechanism of action or 'active ingredient' of the intervention, and redesign the intervention to fit the relevant context.

Consider the following aspects in the design of the intervention:

- What financial resources are available to the project? Can funding be increased or the costs be reduced? Financial constraints will always be relevant in the context of local government in South Africa. Creative and out of the box ways to increase funding or reduce costs must be considered.
- Consider the institutional capacity of the municipality. Does implementation staff have the necessary capacity to implement the proposed intervention? If not, re-evaluate the design of the intervention to make it easier to implement or phase in the intervention in line with the available resources.
- Do the municipal by-laws support the proposed intervention legislative framework that will hinder the implementation of the initiative? Consider this before moving on to the implementation phase of the intervention.
- Is the intervention design based on evidence and reliable data and is it aligned to the key objectives and target group? This will maximise the impact of the intervention.

The intervention design should also include the outcome measures as they directly relate to the key objectives. Outcome measures should be formulated to say something about the effectiveness of the intervention in meeting its behaviour related objectives. Implementers must be cautioned against formulating outcomes measures to answer the question 'did we do what we said we would do?', which is what KPIs are for. Instead, outcome measures answer the question 'did the intervention have the intended effect?'

Picking a scalable intervention is essential for any scaling effort. Determining early on whether the behavioural change or nudge intervention is suitable for scaling can assist in making decisions on whether to proceed or not. Key questions to ask include 'will the intervention reach a bigger audience than the alternatives?', 'will the intervention be more effective at producing the desired behaviour change than the alternative?', 'will the intervention cost less than the alternatives?', and 'will this intervention have more positive effects one year after implementation than the alternatives?'

Overall, before any intervention is to be implemented it is important to ensure that all the proper elements, resources and finances are in place to ensure efficient and effective implementation. Some of the key elements that needs to be in place before implementing a behavioural change intervention and/or nudge includes having a well-structured plan,

appropriate and available funding mechanisms, available and useful resources as well as capacity and human resources to implement the strategy. It is also important that the key goals, outcomes, targets and indicators are outlined, known and understood by all stakeholders involved so that the overall vision and purpose of the implementation is not lost.

6.3 Setting Goals and Targets

The national WC/WDM Strategy outlines 8 key objectives of which Objective 4: To create a culture of WC/WDM for all consumers and users is most relevant for setting goals and targets for behavioural change interventions including behavioural nudges at a municipal level. Strategic outputs that are expected from Water Services Authorities in line with Objective 4 must promote the efficient use of water amongst consumers and customers. In addition, a strategic output for Communication, Community Awareness, Education and Marketing WC/WDM must ensure the creation of awareness of the need for WC/WDM to the public and to influence behaviour patterns of consumers.

The municipality may, as it sees fit, establish objectives in addition to Objective 4 of the national WC/WDM strategy. Once clear objectives have been identified, goals must be set that result in the desired outcomes. Each goal must have targets against which the municipality can measure itself.

A set of typical objectives, goals and targets for behavioural change interventions is presented in Table 5 below. It is not a comprehensive list, it is only intended to serve as a guide in setting behavioural change goals and targets for WC/WDM.

Table 7: Typical Objectives, Goals and Targets for Behavioural Change Interventions

Objective	Potential Goal	Purpose of Goal	Example of a Target
<p>Reduce Per Capita Water Consumption and</p>	<p>Increase advocacy and awareness of water consumption relative to the water demand.</p>	<p>Educate the public about the importance of water conservation and the impact of their water usage</p>	<p>Launch 10 awareness and advocacy campaigns in communities with high water use.</p>
			<p>Implement 10 educational roadshows on how to lower consumption and raise awareness of the water situation in South Africa.</p>
			<p>Launch advertisement material on water saving tips through social media, newspapers, television.</p>
			<p>Create a water saving mascot that people can recognise and be reminded to conserve water</p>
			<p>Install stickers near all public toilets to report leaks and to prompt</p>

	Promote the efficient use of water through behavioural nudge strategies	Encourage individuals to adopt water-saving behaviours through subtle prompts and reminders.	<p>people to turn off the water when not in use.</p> <p>Provide feedback to 10 communities with comparative household water usage data.</p> <p>Install smart meters that provide real time feedback</p>
	Improve community engagement	Foster a sense of community responsibility and collective action towards water conservation	<p>Engage 50 communities on water conservation initiatives</p> <p>Public recognition of communities that reduce water use by 15%</p> <p>Acknowledge ratepayer's associations in area with reduced consumption</p> <p>Create platforms such as online forums or WhatsApp groups to promote and share water saving ideas</p>
Enhance security	water Incentivise water saving behaviour	Motivate users to adopt water-efficient practices	2% discount on water bills for households that reduce consumption by 20%

		Encourage users to report leaking infrastructure	Implement call center to report water leaks
			Issue certificates and/or personalised letters of acknowledgement for reporting leaks.
			Courtesy call to thank individuals for reporting leaks
	Sustain long term water saving	Ensure that water-saving behaviours are maintained over time, not just during periods of drought or water scarcity	Provide after care and ongoing support to users that have reduced consumption by 30%
			Provide water usage Reports with water bill for users to track their consumption and identify areas for improvement

6.4 Potential Implementation Barriers and Constraints

Based on best practices and the engagement with municipalities, various barriers and constraints that prevent the uptake and successful application of behaviour change interventions for water conservation purposes were identified. Municipalities need to be mindful of the following barriers and should consider mitigation measures in the planning and design of their interventions.

6.4.1 Financial and Human Resource Constraints

The lack of financial and human resources is considered one of the main barriers to the effective implementation of behaviour change interventions. This limits the intervention to a small scale and for a short time frame resulting in a limited impact.

Often a limited number of educational officers are appointed, they are unable to conduct education and awareness campaigns throughout the municipal area. Municipalities face a problem of budgets being reduced therefore the intervention cannot be implemented according to the design.

One way to mitigate financial and human resource constraints is to create partnerships with external stakeholders, including private sector partners, NGOs, research institutions, and faith-based organisations. Partners can provide both implementation and funding support, depending on what they have to offer and what incentivises them to participate.

Another mitigation measure is to leverage existing programmes. For instance, the integration of water conservation awareness into existing programmes such as the EPWP is more cost-effective than developing a new programme.

Understanding the economic benefits of conserving water and reducing demand upfront may provide the impetus necessary for decision-makers to commit financial resources for implementation.

In a cash constrained environment, creativity and out of the box thinking is necessary. The design of interventions must be resource effective and take into consideration the institutional environment. Educational workshops with printed materials are inherently costly and time-consuming. The program might have to be redesigned in a way so that more can be done with less. However, this requires staff to have the requisite knowledge and capacity to do so. Staff should be exposed to best practices for general intervention design, particularly how to use behaviour change interventions for water conservation. More training and capacitation might be required to overcome resource constraints. There might also be an opportunity for more

systematic knowledge sharing between municipalities in South Africa to share in what works, what does not work and why.

6.4.2 Lack of Political and Institutional Support

A lack of political and/or institutional support can be a major constraint. Political and institutional support is essential, without which interventions are likely to be implemented in an ad hoc and inconsistent manner.

Politicians often do not want to implement unpopular decisions such as imposing higher tariffs to reduce consumption. Different political parties represented in Council or in a community are less likely to agree on a unified WC/WDM approach especially during times of local elections. Municipalities that have stable local governments and are supported by residents have a better chance of successfully implementing behavioural change interventions, especially in the long-term.

Presenting a business case to the political leadership emphasising the financial benefits of improving water conservation and reducing demand, along with the negative consequences of not acting accordingly, is an effective way to get buy-in. Involving NGOs and academic institutions in behavioural change programmes may be necessary as independence and political neutrality is valued by most politicians.

The presence of strong policies and departments within municipalities that promote water conservation can facilitate political support for the implementation of behavioural change intervention. The adoption of the municipal WC/WDM Strategy is essential as it limits political interference especially if the strategy spans a 5 year period.

6.4.3 Legislative Constraints

Legislative constraints are not widely reported as major barriers in South Africa as the current legal framework creates an enabling environment for the implementation of behaviour change interventions for water conservation. However, legislation, in particular by-laws, can be better used to create more opportunities for municipalities to implement certain types of interventions, and to improve their efficiency and reach.

Due to the Protection of Personal Information Act (No. 4 of 2013), municipalities may not publish water consumption data of individual consumers therefore the comparison of water use data which is an effective nudge/prompt cannot be implemented. This can be overcome by comparing water consumption levels of individual uses to the use per ward and/or to the national norm.

Legislation that regulates municipal functions and public-private partnerships can be restrictive in that municipalities cannot accept financial assistance and/or cooperation from a variety of

partners, including the private sector, NGOs, international organisations and funders. Early discussions, during the design phase, with National Treasury and the Department of Cooperative Governance and Traditional Affairs are necessary to overcome these challenges.

6.4.4 Lack of Trust in Government and Institutions

When residents do not have high levels of trust in their government and institutions, they are less likely to listen to water conservation messages and act when asked to do so. Residents need to trust that local government is doing everything in its power to remedy water shortages before they are susceptible to water conservation messages. Consumers do not feel accountable and responsible for water scarcity issues in their area of residence, unless there is trust in the government that they are doing all that they can.

Communities some time view the existing water shortages as shortcomings of the government rather than circumstances that are outside of government's control. Consumers are aware of the high levels of non-revenue water in the country due to the lack of maintenance therefore they do not believe that conserving water is their responsibility, especially not if they pay for water services. Water conservation messages and programs are better received in areas with low levels of non-revenue water and a general trust in government and its functioning. Fostering ongoing relationships and maintaining transparent interactions with communities will deviate some attention away from questioning government's intentions and credibility and allow communities to see the benefit of the WC/WDM behaviour change intervention.

While increasing trust in government and institutions is not easy and depends on a variety of factors that are outside the control of municipalities, it can and should be considered when designing an intervention to increase the chances of success.

6.4.5 Lack of Consumer Understanding

When municipalities do not fully understand the consumer, they are trying to influence, it can negatively impact the effectiveness of an intervention. Different target groups respond differently to interventions. Often assumptions are made about the wants, needs and perceptions of consumers in the design and implement of interventions. It is imperative to understand the target group.

Targeting communities must be based on accurate and relevant data. Conducting surveys to understand the consumer before an intervention is designed is a cost effective way of getting accurate data. Surveys can also be used to determine what is causing high water consumption levels (i.e., watering gardens, filling pools, internal leaks, faulty water meters, burst pipes, long showers, etc.). Only once there is clarity on the nature and behaviour of the consumers can appropriate interventions be designed to effect behaviour change.

6.4.6 User Experience

Users often perceive water-saving measures as inconvenient, expensive and/or time-consuming, which then discourages them from making changes. Therefore, behavioural change interventions must be easy to adopt, convenient, accessible, accompanied by clear instructions and support for implementing the measures must be provided timeously.

7 FINANCIAL FRAMEWORK

For any intervention to be appropriately designed and implemented, it must be adequately resourced. To upscale and implement behavioural nudges and behaviour change interventions, it is important to know what it will cost and how it will be funded especially in an environment where emphasis is placed on infrastructure development and not behavioural change initiatives.

Although the current funding landscape is fragmented, the main funding for WC/WDM strategies still comes from a combination of government allocations, tariffs and developmental charges. South Africa also relies on external funding and partnerships from international organisations and development finance institutions to support WC/WDM efforts. While it appears as though there are a wide variety of funding options available to finance WC/WDM programmes, a very limited component of the budget actively goes to behavioural change interventions. Capital grant programmes such as the Accelerated Community Infrastructure Programme, Municipal Water Infrastructure Grant and the Regional Bulk Infrastructure Grant can be levered for behavioural interventions such as marketing, awareness creation, social media platforms, funding workshops or training and educational training, and capacity building however very small allocations are made for behavioural interventions. Municipalities need to capitalise of existing opportunities and be open to new opportunities if they want to succeed in funding behavioural interventions in an environment of limited funds and competing priorities.

To this end, implementing agents have started to consider alternate options for funding behavioural interventions such as Performance Based Contracts (PBC). PBC are outcome based; payment is only made if certain contractually defined performance-based indicators are met. This offers municipalities the option of linking financial incentives to the achievements of specific and measurable behavioural change outcomes. Long lasting and effective WC/WDM strategies are key to the success of PBCs because only when targets relating to how much water is saved and conserved does the specialist or contractor get paid. In addition, the value of the contract is linked to the value of the water which is saved through the WCWDM measure. PBC's, in and of itself, is a behavioural nudge intervention as it uses an approach where the buyer tries to nudge the user through incentives and/or punishments to deliver a certain outcome for the buyer who then subsequently can get paid. To date, only two WC/WDM PBCs, both based in the Emfuleni Municipality, have shown successful results. In both contracts the focus was on infrastructure development, without testing the potential water saving due to behavioural interventions. Implementing agents should focus on integrating

behavioural nudges and other behavioural intervention tools in the PBC's to enhance and support the success of technical WC/WDM initiatives.

The City of Cape Town has had great success in implementing behavioural intervention strategies during the recent drought. In reflection, one of the key recommendations made by the municipality is to establish a WC/WDM fund, that specifically focuses on WC/WDM interventions and by extension behaviour change interventions. A dedicated fund with specific instruction on the inclusion of behavioural interventions will ensure the ring fencing of funds and an integrated solution for managing demand and conserving water.

Other funding options that must be considered include co-funding mechanisms with civil society, international funders and the private sector. For example, the DBSA offers a range of financial and non-financial solutions for the water and sanitation sector, including a NRW programme that is open to finding innovative funding solutions for water conservation projects.

As long as municipalities are open to alternate and innovative thinking, there are multiple different methods and opportunities that they can engage to fund and upscale behavioural nudges and other behavioural interventions within their WC/WDM strategies.

8 INSTITUTE AN EFFECTIVE MONITORING AND EVALUATION SYSTEM

An effective monitoring and evaluation (M&E) framework for behavioural interventions is critical to ensure that the intervention remains relevant, is effective, meeting the intended outcomes, that the correct information is used to make decisions, challenges and/or barriers to behaviour change are identified so that the intervention can be corrected accordingly and that municipalities remain accountable for implementation. By systematically monitoring and evaluating behavioural interventions, municipalities can make evidence and outcomes based decision on whether or not to upscaling the intervention.

The M&E framework must be resilient so that it can adapt to changing circumstances and new information. Behavioural change often takes time, and measuring long-term impact requires sustained effort and resources therefore the system must not be onerous, ensuring it can be maintained over the long term. If possible, integrate the reporting into existing monitoring systems and processes to enhance the sustainability of the intervention.

Below is an overview of what needs to be in place to successfully monitor and evaluate the intervention.:

Step One: Understand the Intervention Theory of Change

A Theory of Change (ToC) is a tool that describes a process of change. It is a detailed description and illustration of how and why a desired change is expected to occur in a particular context or due to a specific intervention or initiative implemented. A ToC consists of linking various elements together to create a visual representation of how an intervention will lead to a certain outcome. These elements include: inputs, activities, outputs, outcomes and the various assumptions that lead to certain outputs and outcomes. Specifically, a ToC outlines how specific activities lead to specific outcomes, which in turn helps achieve the desired impact. The ToC is developed to answer key questions such as is this the right intervention; is the intervention achievable and is the intervention likely to create the impact we are aiming for? By developing a ToC, it allows one to get a clear picture and vision of what needs to be done, what resources are going to be needed and what actions are needed to meet the overall vision, objectives and goals. Therefore, it is essential that the behavioural intervention has clearly defined objectives, goals and specific and measurable targets against which the intervention will be monitored. All relevant stakeholders including the water users must be involved in the design and implementation of the M&E framework.

Step Two: Collect Regular, Accurate and Comprehensive Data

All roads lead back to the quality and quantity of the data collected. Behavioural change is influenced by a multitude of factors, making it difficult to isolate the impact of specific interventions. Therefore, collecting comprehensive data on an ongoing basis is crucial. The data must be accurate with no biased reporting that can affect the reliability of the data collected. Data collection is an expensive process hence, municipalities must consider alternate methods of collecting the data such as online platforms, digital tools, self reporting mechanisms, using AI technology and telephone interviews. Data should always be collected in a transparent and just manner. The data must be cleaned and stored correctly to maintain the confidentiality and privacy of participants'.

Step Three: Reporting

Data should be analysed quickly and efficiently so that corrective actions can be implemented immediately based on the M&E findings. The M&E reporting framework should be responsive to change on the ground. Reporting of findings should be premised on an appreciative enquiry approach and not on a fault-finding approach. The findings must be reported transparently and shared with all stakeholders, including the water users.

By meeting these criteria, the progress and impact of behavioural interventions can be tracked providing valuable insights for continuous improvement and decision-making. This will allow implementers to see opportunities for improvement and expansion, particularly by including additional partners or stakeholder. Numerous unanticipated factors are likely to influence the intervention, requiring a continuous process of implementation, monitoring, planning and adaptation. Unanticipated factors could include:

- Improper implementation of the intervention requires it to be amended.
- Additional (funding) support may become available (from partners or stakeholders).
- Financial or implementation support may be withdrawn.
- The intervention is not working as planned and the target group is not responding as expected.
- Unexpected changes in the environment.
- Change in policy and priorities.

The continuous cycle of implementing, monitoring, planning and adapting interventions requires dedicated and capable staff.

A final evaluation of the intervention is an excellent opportunity to invite implementation staff, partners, consumers and other stakeholders to provide comments and feedback on the intervention. Their experiences can offer valuable ideas for additional improvements to the

intervention. Moreover, stakeholders feel motivated and empowered when they are involved in the process and their input is valued. It is essential to celebrate intervention achievements together with partners and consumers.

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ANNEXURE A – EXAMPLE OF AN ACTION PLAN

The Strategy to Infuse the Uptake and Application of Behavioural Nudges and Other Behaviour Change Interventions provides an overall guideline on how to plan and upscale and increase the use of behavioural nudges and other behavioural change interventions within municipalities. However, below is action plan on how to implement, upscale and increase the use of behavioural nudges within municipalities to meet the overall vision which is to promote sustainable water consumption and water management practices across the water sectors of South Africa.

By following this strategy and action plan, municipalities can effectively design and upscale behavioural nudges to promote WC/WDM at a local level.

Step 1: Increase Advocacy, Awareness and Capacity Building within your Municipality with regards to the use of Behavioural Nudges as an intervention tool.

Goal	Action	Target	Timeline	Stakeholder Responsible
The goal is to raise municipalities awareness and knowledge about how to use behavioural nudges as an appropriate and effective tool to enhance WC/WDM initiatives and to equip municipalities with skills and knowledge on how to design and implement behavioural interventions.	Conduct online workshops, training programmes and educational programmes to create advocacy and spread awareness within each municipality.	Launch 10 awareness and advocacy campaigns across each municipality showing how behavioural nudges can contribute to effective WC/WDM strategies.	2025/2026	DWS WRC

Step 2: Planning for the Uptake of Behavioural Nudges within your Municipality.

Goal	Action	Target	Timeline	Stakeholder Responsible
Increase knowledge, background and context of consumer's	Conduct research studies in each municipality to allow for data gathering and planning by each	At least 10 – 15 municipalities across the 9 provinces of South Africa are to report	2025/2026	DWS WRC Municipalities

behaviours, and attitudes towards water consumption and use.	municipality on the different contexts and background of each community in order to address, target and implement the appropriate behavioural intervention. This would also allow for the establishment of a baseline.	and submit their research findings to an online platform, with the appropriate planning document addressing how and what type of behavioural interventions they are going to implement within there are.		
		DWS to conduct at least 2 online workshops to share findings and ideas.	2025/2026	DWS
Establishment of a baseline of consumer attitudes, behaviours and water consumption and use.	Develop, record and make use of the key planning documents, such as WSPD or IDP, to inform, develop and implement behavioural nudges within these strategies.	Online database showing water consumption behaviours, attitudes and use across each municipality.	2025/2026	DWS Municipalities
Establish clear and measurable objectives to improve the uptake of behavioural nudges within municipalities.	Once target behaviours are identified through the research and background gathered, municipalities are to set clear and measurable	Each municipality is to set two clear and measurable objectives on how to include behavioural nudges into their WC/WDM strategies.	2025/2026	Municipalities

	objectives on how to implement behavioural nudges into their WC/WDM strategies.			
Step 3: Adopt policies to include behavioural nudges as a key form or tool to increase WC/WDM strategies.				
Goal	Action	Target	Timeline	Stakeholder Responsible
Promote the adoption of behavioural nudges to enhance water conservation efforts in municipalities.	Adopt policies to include behavioural nudges as a key form or tool to increase WC/WDM strategies.	Each municipality is to adopt at least behavioural nudge intervention tools within their strategies.	2025/2026	DWS Municipalities
Step 4: Implement key behavioural nudge interventions across different municipalities.				
Goal	Action	Target	Timeline	Stakeholder Responsible
Increase advocacy and awareness of water consumption relative to water demand at community, industry and governmental level	Conduct workshops, roadshows and educational programmes to create advocacy and spread awareness on how consumers behaviours impact water consumption and how their behaviour can change and save water.	Launch 10 awareness and advocacy campaigns across each municipality utilising social norms and public good messaging to promote water conservation Adapt school curriculum or engage in 10 educational	2025/2026	DWS DHET

		roadshows across each municipality to raise awareness of the water situation in South Africa and tools on how to lower consumption.		
		Conduct or engage in 10 awareness and advocacy campaigns through community sessions.		
Promote the efficient use of water through the implementation of behavioural nudge strategies	This can be done through implementing various behavioural nudge activities, for example: providing regular feedback on water usages, reminders to save water, offering incentives for reduced water usage such as discounts on water bills or recognition programs as well as making use of visual cues such as stickers near taps or shower heads.	Implement behavioural nudge strategies in at least 5 municipalities within the next 12 months, these can be considered pilot studies.	2026/2027	Municipalities
		Implement social norms feedback programs in 10		

		municipalities providing household with comparative water usage data.		
		Aim for 15% reduction in water consumption in these municipalities within 1 year of the program implementation.		
		Send monthly reports highlighting water saving tips and showing progress made.		
		Implement recognition programmes, reward-based programmes or water saving incentive programmes across municipalities.		
		Launch advertisement material on water saving tips through social media,		

		newspapers, television.		
		Create an online forum to promote and share water saving ideas.		
Reduce Water Wastage through behavioural nudge strategies.	Workshops, training and improved technologies can be utilised to reach this goal.	Conduct workshops and training sessions for businesses in key 5 sectors promoting water efficient practices.	2026/2027	Municipalities DWS WRC Private Sector
		Target a 10% reduction in water usage among participating businesses.		
		Implement feedback forums or reporting mechanism for consumers to report water leakages in their area.		
		Hold 10 training and skills development workshops across the various municipalities on ways to improve infrastructure, technologies and methods to reduce water wastage as		

		well as how to budget for these ideas.		
		Install water saving devices across 5 municipalities. Aim for a 15% reduction in water consumption after 1 year of implementation.		
Step 5: Ensure the Monitoring and Evaluation of strategies and interventions implemented across all municipalities				
Goal	Action	Target	Timeline	Stakeholder Responsible
Increase Monitoring and Evaluation strategies	Track water usage data before and after implementing nudges.	Create a database outlining key water usage and water consumption behaviours.	2027/2028	Municipalities DWS
	Allow for the creation of platforms where lessons learnt can be shared between municipalities.	Conduct two workshops inviting all relevant stakeholders to attend, allowing for the discussion of what has worked in which municipality and what has not worked as a way of sharing knowledge and ideas on conserving and managing water resources.		

