# NATIONAL WATER CONSERVATION AND WATER DEMAND MANAGEMENT STRATEGY



### WATER IS LIFE - SANITATION IS DIGNITY



water & sanitation Department: Water and Sanitation REPUBLIC OF SOUTH AFRICA SOUTH AFRICA IS A WATER- SCARCE COUNTRY



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# **FOREWORD BY THE DIRECTOR-GENERAL**





South Africa is located in a predominantly semi-arid part of the world. The climate varies from desert and semi desert in the West to sub-humid along the Eastern Coastal Area, with an average rainfall for the country of about 450 mm per year (mm/a), well below the world average of about 860 mm/a, while evaporation is comparatively high. As a result, South Africa's water resources are, in global terms, scarce and extremely limited (NWRS1, 2004).

In addition, South Africa is facing increasing water demands to meet the needs of a rapidly growing and urbanising population, changing lifestyles, and economic growth. At the same time, climate change is driving the country towards a warmer and drier future, with longer and more extreme droughts, and more intense floods. The results are less water available to meet the growing demand, thus a threat to water security. Given constraints and demands on the resource, we cannot afford practices which reduce water supply, such as inefficient water management practices, lack of infrastructure maintenance, nonrevenue water and poor governance.

Water demand is likely to grow at about 1.2% over the next ten years, therefore a need to find new ways of reducing water demand and increasing availability - which move beyond 'traditional engineering solutions' of infrastructure development (NWRS2, 2013). Water Conservation and Water Demand Management (WC/WDM) is an integral part of broader strategies needed to reconcile the available supply with the demand for water. It is key to ensure sustainable use of our water resources, and to ensure sufficient water is available for the current and future requirements. The Water Conservation and Water Demand Management Strategy is a fundamental step in promoting water use efficiency as provided in the United Nations Sustainable Development Goal number 6. This is consistent with both the National Water Act (Act 36 of 1998) and Water Services Act, 1997 (Act 107 of 1997) which emphasizes effective management of our water resources and conservation. Water Conservation and Water Demand Management should not be seen as punitive or restrictive but as a responsible approach that will contribute to postponement infrastructure augmentation, of mitigation against climate change, support to economic growth and ensuring that adequate water is available for equitable allocation.

This WC/WDM strategy emphasizes the fact that all consumers and water institutions have a duty towards our country, our environment and themselves to implement adequate measures that contribute to water use efficiency through Water Conservation and Water Demand Management.

Let us work together towards the prosperity of our nation for the benefit of future generations. Let us seize all opportunities of ensuring responsible use of our water resources.

DR SD PHILLIPS DIRECTOR-GENERAL

# **APPROVAL**

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# **EXECUTIVE SUMMARY**



Water is a critical socio-economic enabler. Water is fundamental in the production of food and energy and, in South Africa, access to water is a constitutional right. Inequality and poverty are widespread in South Africa and the economic growth required to alleviate poverty needs water for the production of goods and services. South Africa is a water-scarce country where water creates significant socioeconomic challenges. Population growth is increasing demand for water. Additionally, increased temperatures due to the effects of climate change are likely to exacerbate water scarcity in South Africa in the future. In order to enable economic growth to reduce poverty and inequality an increasingly water-scarce in environment, South Africa needs to maximise the benefit of every drop of water and ensure that not a single drop of this precious resource is wasted.

The National Water and Sanitation Masterplan (NWSMP) puts the National Water Resource Strategy (NWRS2, now updated to NWRS 3) into action and comprises a number of interventions with a specific focus on reducing water demand. The Department of Water and Sanitation (DWS) has also developed its first Integrated Water Quality Management Policy and Strategy in support of this. This indicates acknowledgement of the necessity to formulate enhanced water sector strategies in order to improve South Africa's resilience to climate change. A water deficit is predicted for South Africa by 2030 (DWS, 2018) and it is amidst increasing concern regarding

water security that the importance of updated strategies targeting water use efficiency (WUE) in various sectors has become apparent.

Water Conservation and Water Demand Management (WC/WDM) constitutes a vital initiative that supports the implementation of integrated water resources management (IWRM) principles in order to strengthen the country's ability to address future water deficits. Water conservation and water demand management (WDM) are respectively defined as follows (DWAF, 2004):

- Water Conservation: The minimisation of loss or waste, the care and protection of water resources and the efficient and effective use of water.
- Water Demand Management: 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 services and political acceptability.

WC/WDM is thus concerned not only with reducing water usage and water wastage but also safeguarding the quality and quantity of water resources. Figure i presents a graphical representation indicating how demand can be constrained to within supply augmentation plans and that this can delay the need for augmentation.

# The potential benefits of WC/WDM include the following:

 Water security whereby water demand does not exceed the



Figure i: Graphical illustration of the positive impact of WC/WDM in a system water balance

reliable supply or there is balanced water supply and demand.

- Financial sustainability of the water utility, particularly in those instances where metering, billing and cost recovery are properly implemented.
- Effective operation and maintenance of infrastructure which prevents excessive leakages, avoids deterioration in service delivery, prevents intermittent supply and water rationing, reduced pressures etc. This also prevents intermittent supply which is often caused by excessive leakages as well as depressurisation which damages water supply infrastructure and contributes to water borne diseases due to contaminants seeping into water distribution pipelines.
- Well maintained water supply infrastructure and assets resulting in good service delivery and decreased water leakages.
- Prevention of the creation of unnatural wetlands at microenvironment level which provides a breeding ground for mosquitoes and other health hazards to communities.
- Relatively short timeframes and cost-effective approaches are possible at a macro-level through WC/ WDM interventions. By postponing the construction of augmentation schemes such as large dams, WC/WDM can be implemented in a relatively short time span with a relatively smaller budget as opposed to large augmentation schemes which usually require major capital investment with considerable implementation times of 10 to 25 years, with associated environmental impacts.
- Improved water production through reduced pumping and pipe failures, reduction in chemical costs and associated greenhouse gases.
- Reduction in water use which requires less infrastructure, less debt and lower fixed water costs.
- Flexibility in implementation of WC/WDM intervention measures which can be introduced incrementally.
- Build relationships between government and citizens as the community plays an active role in successful WC/ WDM projects.
- Cost reflective water charges that support sustainable water services by implementing WC/WDM that creates well measured components of the water cycle. This promotes improved knowledge management and costs reductions.

This context led DWS to develop WC/WDM strategies in 2004. The aim of these strategies was to promote sustainable use and management of water resources in South Africa. Since the development of these strategies, new information, concepts and guidelines have been developed which promotes the effective implementation of WC/WDM. To incorporate these advances, the WC/WDM strategies have been updated. It is important to note that the WC/WDM strategies and implementation plan provide guidance for the water sector as a whole. Although these documents have been developed by DWS, the sector needs to mobilise and work together to implement WC/WDM.

There are four WC/WDM strategies with the National Strategy serving as the overarching strategy for South Africa. Three sector strategies have been developed which includes a strategy for the agricultural sector; the industry, mining and power sectors; and the water services sector. These sectors are significant water users in South Africa, and thus sector-specific strategies have been designed to define the way forward to improved water use and management in these sectors. This document presents the National WC/WDM Strategy.

### NATIONAL WC/WDM SUMMARY

The National WC/WDM strategy provides a number of core purposes:

- To provide a framework against which the more practically focused sub-sector strategies can be structured. This coherence is important in ensuring alignment in approach at local, provincial and national levels, as well as being consistent between sectors.
- To support in unlocking more strategic aspects that enable the sub-sector strategies to be implemented.
- To create an improved enabling environment that will facilitate the implementation of WC/WDM nationally and locally.

Towards this end, the WC/WDM strategies have three core focal areas, namely, 1) effective government structures to oversee and regulate the implementation of WC/WDM; 2) strategic development and management of best practice, supporting tools, and financial instruments that guide the effective implementation of WC/WDM; and 3) knowledge management, capacity building and innovation that are leveraged to support improved WC/WDM implementation. These have been translated into Goals and Objectives, as follows:



Figure ii: National WC/WDM strategy results framework

As presented in the figure above, there are a suite of interventions required for achieving the Vision for WC/WDM in the country. Given the current resources available, it is not possible to address all of WC/WDM Strategic Actions simultaneously; human, technical and financial resources as well as information and systems constraints will inhibit this. Nevertheless, it is critical that all water use sectors undertake the necessary interventions to improve the levels of water use efficiency that currently exist. As such, the strategic target is that all water use sectors must ensure a minimum of 70% water use efficiency by 2030, understanding that there is an obligation on all water use sectors to be continually seeking for improvements in these levels.

Therefore, the focus of the implementation plan is to be on delivering change for prioritised challenges. This does not mean that work on other areas pertinent to WC/WDM will not continue, but it serves to guide the allocation of human and financial resources for the 5-year period of the strategy, with the objective of building for longer term improvements. Therefore, a key approach will be to prioritising critical concerns, while ensuring that other issues are addressed through ongoing management or monitoring for future prioritisation and action.

# The following aspects are critical to create an enabling environment:

- Political support and leadership;
- Financing;
- · Institutionalisation;
- Coordination;
- Public support;
- · Enforcement; and
- Monitoring and evaluation (M&E).

# **TABLE OF CONTENTS**

FOREWORD BY THE DIRECTOR-GENERAL	
APPROVAL	iv
ACKNOWLEDGEMENTS	V
EXECUTIVE SUMMARY	vi
TABLE OF CONTENTS	ix
LIST OF TABLES	х
LIST OF FIGURES	х
DEFINITIONS	xi
ABBREVIATIONS	xii

1	Introduction		1
	1.1	Background	1
	1.2	Rationale	1

2	Strategic Imperatives			3
	2.1	Aligni	ng to development agendas	3
		2.1.1	Global	3
		2.1.2	National	5

3	Cont	ext		9
		3.1	Legal Instruments	9
		3.2	Policy Instruments	10
		3.3	Strategies and other Instruments	11
		3.4	Institutional and Governance Framework	13

4	Situational Analysis		18	
		4.1	Status Quo	18
	Agric	culture		21
	Industry, Mining and Power Generation (IMP)		21	
	Wate	er Servi	ces	22
		4.2	Challenges and Opportunities	22
		4.3	Theory of Change	24

Strategic Response			27
	5.1	Vision	27
	5.2	Strategic Target	27
	5.3	Strategic Principles	27
	5.4	Goals and Objectives	27

5

6	Implementation Considerations		31
	6.1	Monitoring and Evaluation	31
	6.2	Sector wide-approaches	32
	6.3	Enabling Factors	32

- 7 Conclusions 35
- 8 References 36

# **LIST OF TABLES**

Table 2-1:		Figu
Actions related to WC/WDM in the		Grap
NCCAS (Republic of South Africa, 2020)	7	impa
Table 3-1:		Figu
Institutional roles for WC/WDM	16	The
Table 4-1:		SDG
Water use projections per sector		Figu
(DWS, 2023)	19	Alig
		(Leig
Table 4-2:		
Strategic Outputs and Activities for the		Figu
DWS in support of WC/WDM and progress made	20	Insti
Table 4-3:		secto Strat
Summary of core WC/WDM challenges		5000
and opportunities	22	Fiau
		Role
		of W
		WC/
		Figu
		Inter
		(DW
		Figu
		Theo
		Figu
		Mult
		(OEC

# **LIST OF FIGURES**

<b>Figure 1-1:</b> Graphical illustration of the positive	
impact of WC/WDM in a system water balance	1
<b>Figure 2-1:</b> The relationship of SDG 6 with the other SDGs (GRID-Arendal/Studio Atlantis, 2020)	4
<b>Figure 2-2:</b> Alignment of the NDP to the SDGs (Leigh, 2021)	5
<b>Figure 3-1:</b> Institutional framework for the water sector. Adapted from the National WC/WDM Strategy (2004).	14
<b>Figure 3-2:</b> Roles of the different institutions in terms of WC/WDM. Adapted from the National WC/WDM Strategy (2004).	15
<b>Figure 4-1:</b> Inter-basin transfers in South Africa (DWS, 2018)	18
Figure 4-2: Theory of Change	25
<b>Figure 4-3:</b> Multi-level governance framework gaps (OECD, 2011)	26
<b>Figure 5-1:</b> Linkages of the strategic objectives for the WC/WDM national strategy to the Theory of Change and the NWRS	28
<b>Figure 5-2:</b> The importance of collective strategy implementation supported by monitoring, reporting and evaluation	28
Figure 5-3: WC/WDM Strategy framework	30
<b>Figure 6-1:</b> Monitoring and Evaluation Framework for Implementation	31

# DEFINITIONS

**Blue Drop:** Potable water incentive-based Regulation Certification Programme

**Catchment:** An area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.

**Conveyance loss:** Loss of water from a channel or pipe during conveyance, including losses due to seepage, leakage, evaporation and transpiration by plants growing in or near the channel.

**Demand-side management:** Any measure or initiative that will result in the reduction of the expected water usage or water demand.

**Green Drop:** Wastewater incentive-based Regulation Certification Programme

**Groundwater:** Rainfall that infiltrates into the soil surface and percolates downwards, seepage from water in streams, lakes and artificial impoundments, and irrigation water that percolates down into the ground and accumulates in aquifers comprising permeable underground layers of sand, gravel and rock.

**Net zero water:** Where the amount of alternative water used, and water returned to the original water source is equal to the total water consumed.

**No Drop:** Water loss reduction incentive-based Regulation Certification Programme

**Non-Revenue Water:** This is the difference between the volume of water supplied into the system and the billed authorised consumption.

**Runoff:** The portion of rainfall on land or on any other surface that drains away to accumulate in a stream or a river, and which does not infiltrate into the surface, get intercepted by vegetation and other covers where it is stored, or evaporate back into the atmosphere. Runoff is also fed by groundwater which moves naturally into streams and rivers.

**Supply-side management:** Any measure or initiative that will increase the capacity of a water resource or water supply system to supply water.

**Surface water:** Runoff that occurs in streams and rivers, also in natural lakes and reservoirs, a major resource for water supplies.

**Wastewater discharge:** Refers to both the quality and the quantity of water discharged. It refers to the discharge to sewer systems as well as to open river systems. Furthermore, the term also covers the diffuse discharge of polluted water into open river systems.

**Water Conservation:** The minimisation of loss or waste, the care and protection of water resources and the efficient and effective use of water.

**Water Demand Management:** 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 services and political acceptability.

**Water Institutions:** Water institutions include both Water Management Institutions and Water Services such as Catchment Management Agencies, Water User Associations, Water Boards, etc.

**Water licence:** A general authorisation issued by a responsible authority for water use is authorised by a licence under the National Water Act, 1998.

**Water Positive:** A term used to describe an industry or corporation that makes more water available than it uses.

**Water resource:** Water that can be used to contribute to economic activity, including a water course, surface water, estuary and ground water in an aquifer.

Water use efficiency: The ratio of water used productively.

**Yield:** The average annual volume that can be drawn from a supply source or supply option to meet a specific demand at a specified service level.

# **ABBREVIATIONS**

AMD	Acid Mine Drainage	NCCAS	National Climate Change Adaptation
A-NDC	First Adaption Communication		Strategy
BUSA	Business Unity South Africa	NCPC	National Cleaner Production Centre
CAIA	Chemical and Allied Industries	NDC	Nationally Determined Contribution
	Association	NDP	National Development Plan
CARA	Conservation of Agricultural Resources	NEMA	National Environmental Management Act
Act		NEPAD	New Partnership for Africa's Development
СМА	Catchment Management Agency	NRW	Non-Revenue Water
CMS	Catchment Management Strategy	NSoW	National State of Water
COGTA	Cooperative Governance and Traditional Affairs (consists of the Department of	NWA	National Water Act
	Cooperative Governance (DCOG) and	NWRS	National Water Resources Strategy
	the Department of Traditional Affairs (DTA); the Municipal Demarcation Board (MDB),	NWSMP	National Water and Sanitation Masterplan
	South African Local Government Association (SALGA) and South African	OECD	Organisation for Economic Co-operation Development
	Cities Network (SACN) are entities reporting to the COGTA Minister: the Municipal	PCC	Presidential Climate Commission
	Infrastructure Support Agent (MISA) reports	PPPs	Public Private Partnerships
DALRRD	<i>to DCOG.)</i> Department of Agriculture, Land Reform	SALGA	South African Local Government Association
	and Rural Development	SDG	Sustainable Development Goals
DBSA	Development Bank of Southern Africa	SWAP	Sector Wide Approaches
DMR	Department of Mineral Resources	SWPN	Strategic Water Partners Network
DWS	Department of Water and Sanitation	UNFCCC	United Nations Framework Convention
EIPs	Environmental Implementation Plans		on Climate Change
GDP	Gross Domestic Product	WAS	Water Administration System
GIZ	Deutsche Gesellschaft für Internationale	WASH	Water, Sanitation and Hygiene
IGCCC	Zusammenarbeit Intergovernmental Committee on	WC/WDM	Water Conservation and Water Demand Management
	Climate Change	WDM	Water Demand Management
IMP	Industry, Mining, and Power Generation	WMA	Water Management Area
IRP	Integrated Resource Plan	WPO	Water Partnership Office
ISA	Infrastructure South Africa	WRC	Water Research Commission
IWRM	Integrated Water Resources Management	WSA	Water Services Authority
M&E	Monitoring and Evaluation	WSDP	Water Services Department Plan
MISA	Municipal Infrastructure Support Agent	WSI	Water Services Institution
MPRDA	Mineral and Petroleum Resource Development Act	WSSLG	Water Services Sector Leadership Group
NBI	National Business Initiative	WUA	Water User Association
		WUE	Water Use Efficiency

# **1** Introduction



## 1.1 BACKGROUND

The developmental imperatives of South Africa are significant and challenging in the face of increasing socio-economic pressures, climate change and ever-increasing demands on a limited water resource. South African livelihoods are dependent on water which is essential to day-to-day life as well as a broader economy that requires water as part of processes and production. Due to the uneven distribution of water resources across the country, the water sector has developed extensive infrastructure to transfer water between catchments to address supply deficits, particularly for key economic nodes. Nevertheless, South Africa falls within the top guarter (25%) of the world's most water-stressed nations (Water Resources Institute, 2023). South Africa is situated in a region that is predominantly semi-arid with an average rainfall for the country of about 450 mm per annum (mm/a), which is well below the world average of about 860 mm/a, while evaporation is comparatively high (DWAF, 2004). According to the 2020/2021 National State of Water (NSoW), 98% of the country's available water resources are already allocated (DWS, 2022). The third edition of the National Water Resource Strategy (NWRS3) highlights that South Africa is currently overits renewable water exploiting resources on a national level and requires both demand-side and supply-side interventions to address a projected supply deficit of 17% by 2030 (DWS, 2021). There are also

limited opportunities to supplement future water requirements with conventional surface water resources.

South Africa is ranked amongst the top half of most vulnerable countries in terms of climate change vulnerability and particularly with regards to waterrelated climate change vulnerability (University of Notre Dame, 2023). It is also ranked amongst the top half of countries that have suffered the most climate change-related historic losses in the last two decades (Eckstein, et al., 2019). Therefore, the need to develop improved levels of climate resilience in conjunction with efforts to address developmental objectives will be important for the medium- to long-term.

This will require a coherent multisectoral response, undertaken with the leadership of the Department of Water and Sanitation (DWS). A climate resilient water sector, that underpins the country's sustainable development objectives, will require the combined efforts of public sector, private sector and civil society stakeholders.

# **1.2 RATIONALE**

South Africa falls within the top quarter (25%) of the world's most water-stressed nations (Water Resources Institute, 2023). According to the 2020/2021 NSoW, 98% of the country's available water resources are already allocated (DWS, 2022). The second edition of NWRS2 (issued in 2013, now in its third revision) already highlighted that South Africa is currently over-exploiting its renewable water resources on a national level and requires both demand-side and supply-side interventions in order to address a projected supply deficit of 17% by 2030 (DWS, 2018). There are also limited opportunities to supplement future water requirements with conventional surface water resources.

Water has been identified as key to ensure social, economic and environmental viability, sustainability and growth. The water-energy-food interrelationship is critical to building more resilient and sustainable economy. Not taking water insecurity into account when planning can - apart from affecting a country's economic growth - also lead to fragility and conflict. Ensuring that the available water supplies are optimally utilised, and the current resources are optimally stretched is important in ensuring equitable access to and sharing of resources. This contributes directly to the National Development Plan (NDP) 2030 goal of "reducing demand rather than increasing supply", particularly when considering the impact of climate change that will continue to disrupt the already stressed water resources.

Water demand South in Africa is expected to increase over coming years especially in the agricultural, industrial, and municipal sectors. The rising demand is driven by a combination of population growth, urbanisation, rising incomes, irrigation expansion, non-renewable electricity generation and a growing manufacturing sector (Donnenfeld, et al., 2018). Despite this, South Africa has managed to enable continued socio-economic development through the strategic use of bulk water transfers and the ongoing development of large-scale infrastructure. Nonetheless, the national water resource system is under pressure.

The above is further exacerbated by South Africa's vulnerability to climate change and is ranked amongst the top half of most vulnerable countries in terms of climate change vulnerability overall, and water-related climate change vulnerability in particular. The increased frequency and severity of droughts in recent years – such as Cape Town's 'Drought of the Century' between 2016 and 2018 - and other similar extreme weather events such as the Cape storms and occasional flooding in Gauteng and Kwa-Zulu Natal have exacerbated the situation. At the time of publishing the NSoW, water restrictions were still applicable for all water supply systems in the Eastern Cape (which is currently experiencing a drought), the Polokwane system in Limpopo, and the Bloemfontein system in Free State Province (DWS, 2022). While the water required for human consumption (including commercial and industrial use), is not as large as other uses, it can be highly significant in catchments where there are high levels of allocation, and this is exacerbated in drought conditions which are expected to increase in frequency and severity due to climate change.

When water resources become scarce, domestic water supply will generally be prioritised over agriculture and the environment. This is becoming increasingly important as South Africa works towards the attainment of the Sustainable Development Goals (SDGs) Goal 6, as well as addressing historic imbalances in terms of access to safe and secure water and sanitation services. This while also considering the increasing challenges related to population growth and urbanisation.

While the quantity of water is the main focus in improving water use efficiency (WUE), water quality cannot be removed from the discourse as South Africa is plagued with a range of pollution problems in many of its catchments, further impacting on the water security of the country. Poor water quality impacts upon the fitness for use of water resources and can reduce the volumes of water available for use. As such, effective and efficient use of scarce water resources is becoming increasingly critical. Adaptation actions are considered essential to building resilience to climate change impacts and the WC/WDM strategy is a key strategy to address growing water stress.

There are many dimensions to the business of water resource management that are interdependent and

interconnected, and as such this creates considerable complexity in ensuring the attainment of strategic objectives. Towards this end, progressive development of the NWRS (now in its third edition) has endeavoured to provide structured implementation plans to support the national development agenda.

Giving effect to the NWRS3, is the National Water and Sanitation Masterplan (NWSMP), with its rallying "Call to Action", makes a specific note to reduce water demand among other intervention options. In support of this, and the NWRS, DWS is undertaking important studies such as the updating of the water reconciliation strategies and updating the national water balances to provide a more informed baseline from which directed actions can be developed and implemented. This demonstrates the recognition of the need to develop improved water sector strategies that help to build a more climate resilient South Africa. In response, the National Water and Sanitation Masterplan is also being updated to ensure the country is incrementally improving its sectoral resilience. Noting the water security concerns and the projected deficit by 2030 (DWS, 2018), the development of updated strategies to drive WUE across various sectors have become equally important.

At the centre of all these strategic instruments, WC/ WDM is an essential part of the national imperative to address all three of the integrated water resources management (IWRM) principles (social equity, economic efficiency and environmental sustainability) and to underpin the country's ability to address future water deficits. According to the 2004 National WC/WDM strategy (DWAF, 2004), water conservation and water demand management (WDM) are respectively defined as follows:

- *Water Conservation:* The minimisation of loss or waste, the care and protection of water resources and the efficient and effective use of water.
- Water Demand Management (WDM): 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 services and political acceptability.

The Organisation for Economic Co-operation and Development (OECD, 2001) defines water conservation as "the preservation, control and development of water resources, both surface and groundwater, and prevention of pollution". According to Brooks, water demand management (WDM) can be seen as any actions that reduce the amount of water used or enable water to be used more efficiently or any action that keeps the water cleaner during that use than it otherwise would be (Brooks, 1997). Other scholars have defined WDM as a strategy or approach that stresses making better use of existing water supply rather than developing new ones; and uses a set of incentives to achieve this (Savenije & Van Der Zaag, 2002). From these definitions, it can be concluded that while water conservation has a broader scope which includes the protection of water resources and prevention of pollution, WDM is specifically focused on reducing water use/consumption by water users. WC/ WDM intervention are thus concerned not only with reducing water usage and water loss but also preserving the state of water resources both in terms of quality and quantity. Figure 1-1 illustrates graphically how water conservation can be used to constrain demand to levels that align with planned supply augmentation. The reduced demand can also delay the need for increased supply projects.



Figure 1-1: Graphical illustration of the positive impact of WC/WDM in a system water balance

Unfortunately, the term 'WUE' is used with different meanings in the literature and by stakeholder groups and sectors, creating confusion. The California Water Code calls WUE "the efficient management of water resources for beneficial uses, preventing waste, or accomplishing additional benefits with the same amount of water." This aligns with the fact that for many, WUE is generally understood to be the ratio between water use and water withdrawn from the resource. In this regard, the NWRS (Editions 2 and 3) both recognise that WC/WDM strategies are an important approach to driving WUE across the various socio-economic sectors. The potential benefits of WC/WDM include the following:

 Water security whereby water demand does not exceed the reliable supply or there is balanced water supply and demand.

- The beneficial usage of water is maximised through reducing nonessential or possible low-value uses, based upon agreed upon criteria.
- Water positive strategies towards influencing water demands support achievement of targeted consumption levels that are sustainable, equitable, efficient and take into consideration the limitations of water resources.
- Reduced requirement for infrastructure development with a focus upon more effective operation and maintenance of existing infrastructure. Relatively short timeframes and costeffective approaches are possible at a macro-level through WC/WDM interventions. By postponing the

construction of augmentation schemes such as large dams, WC/ WDM can be implemented in a relatively short time span with a relatively smaller budget as opposed to large augmentation schemes which usually require major capital investment with considerable implementation times of 10 to 25 years, with associated environmental impacts.

- Potential for reduction in energy consumption linked to pumping, water conveyance and water treatment, thereby reducing energy load as well as greenhouse gas emissions.
- Flexibility in implementation of WC/WDM intervention measures which can be introduced incrementally, particularly where institutional capacity challenges

exist. Building relationships between government, the private sector, civil society and citizens will provide for a multifaceted approach in successful WC/WDM projects.

- Cost reflective water charges that support sustainable water supply and services and by implementing WC/ WDM that create well-measured components of the water cycle. This promotes improved knowledge management and cost reduction over time.
- Financial sustainability of the water utility, particularly in those instances where metering, billing and cost recovery are properly implemented.

The current national and sectoral WC/WDM strategies were developed in 2004 with sectoral strategies covering the agriculture, water services, and industry, mining, and power generation (IMP) sectors. Since 2004, it can be appreciated that there have been significant shifts in the status of the country's water resources, both in water availability and quality, as well as a range of changes to the broader social economy of the country. The past decade has also seen significant changes in the understanding of climate change and the detrimental impacts that this is having on water resource globally. The onset of the Covid-19 pandemic has also placed renewed focus on SDG 6 and has specific water, sanitation and hygiene (WASH) implications. With water now being considered Personal Protective Equipment in the fight against Covid-19, and others future pandemics, it becomes even more critical to improve our country's WUE. Additionally, there have also been advancements in technology and innovative approaches to water management. It is in this regard that the 2004 WC/WDM national and sectoral strategies have been updated.

Parallel to the updating of the WC/WDM strategies, DWS has undertaken the development and finalisation of the NWRS3, is updating of the National Water and Sanitation Masterplan, is updating and revising the country's National Water Balances which looks to support the reconciliation of water supply and demand, is undertaking processes

to establish Catchment Management Agencies while reforming other elements of the institutional framework, as well as a significant range of other essential interventions to improve water security and ensure sustainable growth and development. The water sector is inherently complex and as such these concurrent processes create the unique opportunity for improved levels of alignment that provide the basis for a resilient and sustainable future. The developmental agenda asset out in the National DevelopmentPlan (National Planning Commission, 2012) recognises the importance of water and as such this will require horizontal integration between sectors as well as vertical integration between levels of government, the private sector and society. This requirement is well understood by the water sector, albeit complex, and will require active support and guidance. Towards this end, it will be essential to:

- Provide clear sector leadership that fosters engagement and active participation in interventions to ensure a water secure future.
- Progressively establish, develop and capacitate the institutional frameworks that manage and develop water resources to provide effective water governance.
- Improve the levels of cooperative government between the spheres of government to ensure aligned approaches that support development while recognising the criticality of reducing water demand.
- Develop approaches to operational management and development of water resources that underpin improved levels of WUE.
- Undertake initiatives to build capacity and create awareness so that the WC/WDM becomes an entrenched behaviour amongst all South Africans.

### 2.1 ALIGNING TO DEVELOPMENT AGENDAS

#### 2.1.1 Global

Population growth continues to increase water demands, thereby putting strain on water resources. Globally 2.2 billion people lack access to safely managed drinking water (UN, 2023). The quality of water resources is threatened by improper sanitation and wastewater discharges. Additionally, rising global temperatures due to climate change have the potential to increase water scarcity in many regions. In the South African context, this is likely to result in longer dry periods broken by more extreme rainfall events that potentially result in flooding. The impacts of climate change will be experienced in varying ways across the globe, and likewise these will be varied within South Africa where there is considerable climate variability.

It is against this background that world leaders, international organisations, national ministries and government departments, private sector companies and civil society are raising the alarm and targeting ways to use less water and reduce our impacts on water resources and the environment. The SDGs, underpinned by ongoing monitoring and reporting, is having significant influence on the approaches being used at transboundary, national and local levels with the support of public sector, private sector and civil society actors.

The SDGs form part of the 2030 Agenda for Sustainable Development which aims to "provides a shared blueprint for peace and prosperity for people and the planet, now and into the future" (UN, 2023). SDG 6 focuses on water and sanitation and aims to ensure availability and sustainable management of water and sanitation for all (UN, 2023). SDG 6 has eight targets which are as follows:

- By 2030, achieve universal and equitable access to safe and affordable drinking water for all.
- By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.
- 3) By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.
- 4) By 2030, substantially increase WUE 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.
- 5) By 2030, implement IWRM at all levels, including through transboundary cooperation as appropriate.

- By 2030, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.
- 7) By 2030, expand international cooperation and capacitybuilding support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.
- 8) Support and strengthen the participation of local communities in improving water and sanitation management.

Under the eight targets sit twelve indicators for the targets. South Africa adopted the SDGs in 2016 and reports on all twelve of the indicators for SDG 6 (Goal Tracker, 2023). SDG 6 has strong linkages with the other 16 SDGs (Figure 2-1). Water provides the means for development, contributing to food security, energy production and health, while access to sanitation has health and environmental benefits. Additionally, water and sanitation are enablers for development and wellbeing in that access to water and sanitation will contribute to reduced inequality and poverty and help to foster a quality learning environment and reduce conflict.



Figure 2-1: The relationship of SDG 6 with the other SDGs (GRID-Arendal/Studio Atlantis, 2020)

Importantly, efforts to combat climate change and reduce the impacts of the hazards that are exacerbated by the rise in global temperature, are strongly linked to the manner in which water resources need to be managed. SDG Goal 13 is therefore focused on taking urgent action to reduce the emissions that are driving climate change while building the adaptive capacity need to improve the resilience of lives and livelihoods. In this regard, the Sharm el-Sheikh Implementation Plan (2022)1 noted "...the critical role of protecting, conserving and restoring water systems and water-related ecosystems in delivering climate adaptation benefits and co-benefits, while ensuring social and environmental safeguards...". The plan recognised

that the levels of adaptation (at a global scale) required were not sufficient and urged parties to scaleup actions to enhance adaptation, with a specific emphasis being placed on the protection, conservation and restoration of water and water-related ecosystems.

While the attainment of the targets under SDG 6 is often understood as being largely driven through the public sector and civil society organisations, there is increased effort from the private sector to improve WUE with the aim of doing more with less, i.e., producing more revenue or product per volume of water consumed. Efforts are increasingly being undertaken under the banner of water stewardship, with a number of global standards leading the approach. Globally, water stewardship is being embraced and adopted by many businesses, particularly those companies featured as the Global 500, in part because companies are starting to understand water stewardship as an approach that can protect, manage and grow value, rather than simply being needed to minimise risk (Morgan, 2018). Nevertheless, it is recognised that water stewardship does realise financial efficiencies, builds resilience to water stress, supports compliance with regulations, underpins the social license to operate, fosters a dependable supply of water, as well as strengthens business reputation and credibility.

<sup>\*/&</sup>gt;https://unfccc.int/sites/default/files/resource/cop27\_auv\_2\_cover%20decision.pdf

The efforts of the private sector, aligned with the requirements of global stewardship standards, are being focused on efforts "within the enterprise fence" as well as beyond with a focus on catchment level interventions. Thus, while companies track their performance in terms of WUE and reflect progress in annual environmental, social, and corporate governance reports, these enterprises will support upstream and downstream interventions that enable improved catchment management and sustainable water resource development. More recently, aspirations have shifted to targeting Net Zero Water or becoming Water Positive. According to the United States Environmental Protection Agency, "achieving Net Zero Water means limiting the consumption of water resources and returning it back to the same watershed so as not to deplete the resources of that region in quantity or quality over the course of the year" (US EPA, 2022).

### 2.1.2 National

#### Development

South Africa's vision for 2030 is presented in the NDP 2030 (National Planning Commission, 2012) and is aligned to the Africa Agenda 2063 which is a strategic framework for the socio-economic transformation of the continent within a 50-year period. The primary aim of the NDP is to eliminate poverty and reduce inequality by "growing an inclusive economy, building capabilities, enhancing the capacity of the state and promoting partnerships throughout society" (National Planning Commission, 2012). The NDP recognises that access to water and sanitation services are cross cutting issues and necessary enablers for addressing poverty, unemployment and inequality. In terms of water, the NDP envisages that by 2030:

- All main urban and industrial centres will have reliable water supply to meet their needs, while increasingly efficient agricultural water use will support productive rural communities.
- Natural water sources will be protected to prevent excessive extraction and pollution. Water will be recognised as a foundation for activities such as tourism and recreation, reinforcing the importance of its protection.
- Where rivers are shared with other countries, South Africa will ensure that it continues to respect its obligations.
- Before 2030, all South Africans will have affordable, reliable access to sufficient safe water and sanitation. Service provision arrangements will vary in different parts of the country, with different approaches adopted for densely built-up urban areas and scattered rural settlements.
- Water demand will be reduced by 15% below baseline levels in urban areas by 2030.

Although the NDP pre-dates the SDGs, there is alignment and a strong resonance. The Department of Planning, Monitoring and Evaluation found that 74% of the 169 SDG targets are addressed by the NDP as shown in Figure 2-2 (Leigh, 2021). Of the 26% of targets that are not addressed in the NDP, 19% are addressed in other sectoral programmes and 7% are not applicable to South Africa such as targets related to small islands and fragile states (Leigh, 2021). Thus, working towards the vision of the NDP will also drive progress on achieving the SDGs.



Figure 2-2: Alignment of the NDP to the SDGs (Leigh, 2021)

The NWRS is the planning instrument for implementing the National Water Act (NWA) and provides strategic guidance to the broader water sector as to the range of activities required over a five-year period that will realise identified water resource management goals. Hence, it provides the framework for managing water resources across all sectors. Since the promulgation of the NWA in 1998, three editions of the NWRS have been published. NWRS2 and 3 build on the progress that was made with the implementation of the NWRS1 and are tasked to ensure that national water resources are managed towards achieving South Africa's growth, development and socio-economic priorities in an equitable and sustainable manner over the next five to ten years. The NWRS gives effect to the achievement of various SDGs Targets, 6.3, 6.4, 6.5, and 6.6. Through NWRS, the setting of water quality targets for different water resources is prioritised demonstrating support for target 6.3. The NWRS stipulates the principles for water conservation and water use and determines how much water is available in each water management area (WMA) and is supportive of the national efforts to attain the targets for SDG 6.4. In support of SDG 6.5 the NWA and the NWRS provide for the establishment of water resource management institutions and outlines the strategic, planning and regulatory inter-relationships between these institutions including international obligations.

#### Climate

South Africa is committed to combatting climate change and submitted its first Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2015. The NDC was subsequently updated in 2021 (Republic of South Africa, 2021). The NDC provides South Africa's target for greenhouse gas emissions in order to mitigate climate change and is aligned to the Paris Agreement. Achieving the NDC requires decarbonisation of the energy sector as this contributed 80.1% of the 2017 emissions (DFFE, 2021). The Integrated Resource Plan (IRP) of 2019 is key to this transition. Although primarily concerned with energy production, the IRP acknowledges the challenge of water scarcity in South Africa and considers adopting technologies which reduce water usage (DMRE, 2091). It also discusses the waterenergy nexus and the possibility of deploying energy technologies for desalination to improve water security (DMRE, 2091).

The 2021 NDC also contains South Africa's first adaptation communication (A-NDC) which provides goals and investment requirements for implementing the adaptation plan. The A-NDC is informed by the National Climate Change Adaptation Strategy (NCCAS) which was adopted in 2020.

The NCCAS consists of four strategic objectives which are supported by interventions, outcomes and actions (Republic of South Africa, 2020). The four strategic objectives of the NCCAS are:

- 1) Build climate resilience and adaptive capacity to respond to climate change risk and vulnerability.
- 2) Promote the integration of climate change adaptation response into development objectives, policy, planning and implementation.
- 3) Improve understanding of climate change impacts and capacity to respond to these impacts.
- 4) Ensure resources ands systems are in place to enable implementation of climate change responses.

Table 2-1 summarises the actions related to WC/WDM in the NCCAS. Action 1.1.32 supports improving the quality of treated wastewater in urban areas which supports the objective to improve water quality and halve the proportion of untreated wastewater and increase recycling. Actions 1.1.7, 1.1.27 and 1.1.32 support the improvement of WUE furthering progress towards SDG 6.4. SDG 6.6 aims to protect and restore water-related ecosystems and is supported by action 1.1.23.

#### Table 2-1: Actions related to WC/WDM in the NCCAS (Republic of South Africa, 2020)

	Action	Description
Interve adaptiv	ntion 1: Reduce human, econo /e capacity	mic, environment, physical and ecological infrastructure vulnerability and build
Outcom ecologi	ne 1.1: Increased resilience and cal infrastructure	d adaptive capacity achieved in human, economic, environment, physical and
1.1.7	Invest in knowledge and capacity building for climate-resilient rural livelihoods.	Support rural livelihoods through knowledge and capacity building, particularly for women from vulnerable households. This could include capacity in areas like climate-smart and conservation agricultural practices, water-saving practices and building climate resilient structures.
1.1.27	Support farmers (male and female) to use and manage water more sustainably.	This will involve the promotion and subsidisation of water conservation technologies, taking into account gendered roles and responsibilities in relation to water management.
1.1.28	Ensure that water management institutions incorporate adaptive management responses.	This will involve providing continued support and advice to water management institutions on how to incorporate adaptive management responses.
1.1.32	Adopt water-wise water management practices in urban areas.	This will involve identifying and adopting suitable water-wise water management practices in urban areas such as sustainable drainage systems and wastewater treatment systems that are able to clean wastewater to a high enough water-quality level that it can be re-used.

The Presidential Climate Commission (PCC) was established by President Cyril Ramaphosa with the purpose of "oversee(ing) and facilitate(ing) a just and equitable transition towards a low-emissions and climate-resilient economy" (PCC, 2023). The PCC's Just Transition Framework defines a just transition in relation to water as follows:

"... A just transition builds the resilience of the economy and people through affordable, decentralised, diversely owned renewable energy systems; conservation of natural resources; equitable access of water resources; an environment that is not harmful to one's health and well-being; and sustainable, equitable, inclusive land-use for all, especially for the most vulnerable" (PCC, 2022).

#### **Partnerships and Stewardship**

Noting the developmental agenda, under increasingly water constrained contexts, the private sector is progressively engaging with government to develop approaches that will support sustainable growth. This aligns with international trends as well as with the imperatives as set out in the NWRS (DWA, 2013) and NWSMP (DWS, 2018).

The establishment by DWS of the National Water Partnerships Programme and a Water Partnerships Office (WPO), hosted and supported by the Development Bank of Southern Africa (DBSA), provides the basis for a multi-partner programme to support priority water sector challenges that will underpin socio-economic development. The WPO is a ringfenced entity housed in DBSA that will:

- Develop standardised national programmes for private sector participation in water and sanitation services, to make it easier, quicker and cheaper to enter into partnerships with government, without having to 'reinvent the wheel' for each partnership;
- Support municipalities, water boards and potentially water management institutions to participate in the programmes and preparation of

projects – where these institutions are lacking in the required expertise and funding to undertake bankable feasibility studies and financial structuring; and

 Where appropriate, facilitate blended financing, including participation by development financing institutions.

The National Water Partnerships Programme therefore aims to facilitate private sector participation, not only from a funding perspective, but also from an operational, maintenance and implementation perspective. Sub-programmes planned include addressing non-revenue water (NRW), water reuse and desalination amongst others, and as such provides key initiatives in support of WC/WDM nationally.

With South Africa's demand for water expected to rise, and resultant 17% supply-demand gap by 2030, the NWRS has indicated that water stewardship presents innovative and collaborative methods for improving water security beyond traditional water resource

management mechanisms in which government is the only player. This is aligned with global trends. Water stewardship embraces multi-stakeholder collaboration involving public sector, civil society, academia and other players working alongside/collaboratively with government to find solutions to water security challenges. The Strategic Water Partners Network (SWPN) was established as a dynamic and cutting-edge partnership that serves as a coordination platform to foster engagement between public sector, private sector and civil society organisations with the aim to collectively find solutions for the country's most pressing water challenges. Established in 2011, the SWPN is a multi-stakeholder platform led by the DWS and hosted by the New Partnership for Africa's Development (NEPAD) business foundation. Set out to operate through six (6) Thematic Working Groups originally, the SWPN has recently consolidated its working structure to now consist of four namely (i) Agricultural Supply Chains, (ii) Water Efficiency and Leakage Reduction, (iii) Effluent Wastewater Management and Sanitation and (iv) Water Stewardship. The SWPN has been working with pioneer partners including the Water Resources Group supported by the World Bank and the International Finance Corporation, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), World Economic Forum, South African Breweries, Coca-Cola, Anglo American, Sasol, Nestlé, Eskom and the NEPAD Business Foundation, amongst others, in an initiative to close the water gap by 2030.

Since its inception in 2011, the SWPN has realised significant milestones in coordinating stewardship actions through collaborations across South Africa's water space.

#### Key milestones over the years include:

- The 'No Drop' initiative: Complementing the 'blue drop' and 'green drop' initiatives, the no drop initiative helps to identify municipalities that are struggling with water losses to create awareness and opportunities for publicprivate sector partnerships to address these issues.
- Support to the coordination of the mine water management in the Olifants River Catchment: Establishment of a mine water coordinating body to lead the collaborative planning towards realisation of reuse and treatment potential, as well as helping to improve water quality and quantity in the catchment.
- Championing of the water administration system (WAS): Through the SWPN, the DWS has implemented the WAS Release Module at several irrigation schemes, a system which helps to release the correct amount of water from a source based on demand, thereby reducing wastage. (DWS, 2018)
- The Vaalharts Scheme Irrigation Upgrade: Actions to address the 30% water losses issue; well as
- **Stewardship support:** Studies to investigate required interventions and develop investment plan for stewardship interventions to improve progress towards addressing South Africa's water supply gap.

### 3.1 LEGAL INSTRUMENTS

The original mandate for efficient and effective distribution of water resources comes from the Constitution of the Republic of South Africa Act (No. 108 of 1996), which states that every citizen has, amongst other things, a right to sufficient food and water. Thus, water is placed at the forefront of human development, emphasising the importance of water management and its beneficial use. The Constitution provides the foundation for sound water management and the view that the resource must be used carefully to meet the condition of sufficiency for all. Importantly, in the Schedules of the Constitution the responsibility for water resource management is one of national competency residing with the Minister of Water and Sanitation, while the responsibility for the provision of water and sanitation services is constitutionally mandated to local government.

The National Water Act (NWA) (No. 36 of 1998) recognises that water is a scarce and precious resource that belongs to all the people of South Africa, and that the goal of water resource management is to achieve the sustainable use of water for the benefit of all South Africans. The Act aims to develop, protect, use, conserve, manage and control water resources overall, promoting the integrated management of water resources with the participation of all stakeholders. Therefore, the Act addresses the development of strategies to facilitate adequate water resource management, alongside related legislation.

Importantly, the NWA provides a number of key provisions with regard to WC/WDM, some of which are provide below:

 Section 6 (1) (h) notes that the NWRS must set out the principles relating to WC/WDM;

- Section 9 (c) notes that a catchment management strategy (CMS) must set out the strategies, objectives, plans, guidelines and procedures of the CMA for the protection, use, development, conservation, management and control of water resources within its WMA;
- Section 9 (e) noted that the CMS must contain water allocation plans which are subject to section 23, and which must set out principles for allocating water, taking into account the factors mentioned in section 27(1);
- Section 9 (f) take account of any relevant national or regional plans prepared in terms of any other law, including any development plan adopted in terms of the Water Services Act, 1997 (Act No. 108 of 1997);
- Section 27 (1) (c) indicates that in issuing general authorisation or licence, a responsible authority must take into account all relevant factors, including efficient and beneficial use of water in the public interest;
- Section 29 (1) (b) (i) indicates that a responsible authority may attach conditions to every general authorisation or licence specifying management practices and general requirements for any water use, including water conservation measures;
- Section 56 (2)(a)(v) indicates that the pricing strategy may contain a strategy for setting water use charges for funding water resource management, including the related costs of water conservation; and
- Schedule 3 indicates that powers that may be exercised and duties to be performed by CMAs on assignment or delegation. Clause 6 (1) (iv) provides that if a CMA on reasonable grounds believes that a water shortage exists or is about to occur within an area it may, despite anything to the contrary

in any authorisation, by notice in the Gazette or by written notice to each of the water users in the area who are likely to be affected require specified water conservation measures to be taken.

These legal provisions outline the key aspects that need to be considered in ensuring WC/WDM is operationally applied. This then includes:

- Ensuring WC/WDM is incorporated into strategic and planning instruments;
- Ensuring WC/WDM is considered in water use licensing and other regulatory instruments;
- Introducing management measures and practices;
- Using charges to fund water resource management and water conservation; and
- Declaring of water restrictions when there are reasonable grounds.

The **Water Services Act (No. 108** of **1997)** provides a framework for the provision of water supply and sanitation services to end users such as households, businesses, and industries, within municipalities. It sets the standards for the local and provincial spheres of government and establishes the norms and standards for tariffs. The main objectives of the Water Services Act (No. 108 of 1997) are to provide for:

- The right of access to basic water supply and the right to basic sanitation, by securing sufficient water and an environment not harmful to human health or wellbeing.
- Setting of national standards and norms as well as standards for tariffs in respect of water services.
- Preparation and adoption of water services development plans by Water Service Authorities (WSAs).

- A regulatory framework for water services institutions and water services intermediaries.
- Establishment and disestablishment of Water Boards and water services committees and their duties and powers.
- Monitoring of water services, and intervention by the Minister or by the relevant provincial government departments.
- Financial assistance to water services institutions.
- Gathering information in a national information system and the distribution of that information.
- Accountability of water services providers.
- The promotion of effective water resource management and conservation.

The **Conservation of Agricultural Resources Act** (CARA) 1983 (Act No. 43 of 1983) provides for the control over the utilisation of the natural agricultural resources of South Africa in order to promote the conservation of the soil, the water sources and vegetation, and the combating of weeds and invader plants. This legislation promotes sustainable use of natural resources in order to ensure long-term productivity of the plant production sector.

Industrial activity is regulated through the **Industrial Development Corporation Act, 1940. (Act No. 22 of 1940)** embeds water stewardship approaches during the establishment of new or development of existing industries and industrial undertakings, the National Water and Sanitation Master Plan - 2019 and the NWRS 2 (2013). Mining and related activities in South African are regulated by the **Mineral and Petroleum Resource Development Act, 2002 (MPRDA)** in conjunction with the **National Environmental Management Act (Act 107 of 1998) (NEMA)**, and the regulations promulgated thereunder regulate the environmental aspects related to mining.

### 3.2 POLICY INSTRUMENTS

The National Water Policy (DWA, 1997) provides the formal statement of intent for the South African water sector. This is then codified in legal instruments such as the NWA (Act 36 of 1998). The National Water Policy was based upon a suite of principles that normatively directed the construction of the policy. In these principles, Principle 14 states that 'Water resources shall be developed, apportioned and managed in such a manner as to enable all water use sectors to gain equitable access to the desired quantity, quality and reliability of water. Water Conservation and other measures to manage demand shall be actively promoted as a preferred option to achieve these objectives. As such, this principle recognised the critical importance of WUE, of the use of water conservation measures to drive behaviours and the management of demand to ensure that water is equitably available for multiple and transformative purposes. Furthermore, this principle also

notes the importance of WC/WDM in terms of ensuring the availability of sufficient water quantity and quality, as well as its importance in terms of assurance of reliable supply. Towards this end, Principle 13 is important that it indicates that National Government is the custodian of the nation's water resources and as such "shall ensure that the development, apportionment, management and use of those resources is carried out using the criteria of public interest, sustainability, equity and efficiency of use in a manner which reflects its public trust obligations and the value of water to society while ensuring that basic domestic needs, the requirements of the environment and international obligations are met". This places the responsibility on the DWS to undertake the necessary interventions to ensure that water resources are managed, developed, apportioned and used in a manner which is sustainable, equitable and efficient.

The National Water Policy builds upon these principles to identify priorities for the introduction of water conservation.

#### These include:

- Finding a balance between promotion and enforcement in terms of regulating water use practices in accordance with water use authorisations.
- Promotion of better water utilisation through research, pilot projects, education and general communication activities supported by the use of regulatory incentives and penalties.
- Exchanging information on water use behaviours and what is being achieved in terms of WUE as a means of identifying good practices, of sharing these practices, while intervening to address poor performance.
- Developing a formal policy for water conservation and use in each of the main user sectors, such as agriculture, industry and mining. This will include regulations for water conservation in each use sector to ensure their long-term water security.
- Putting in place the necessary tools and methodologies to support WC/WDM supported by the collection of data and information that will underpin awareness creation and knowledge exchange.
- Developing specific institutional arrangements as a means to promote more efficient water use. Towards this end, the WC/WDM function of the national Department will be strengthened with this being a priority focal point for water resource management.

The **Strategic Framework for Water Services** (DWAF, 2003) sets out the national framework for the water services sector (water supply and sanitation). The purpose of the Strategic Framework was to put forward a vision for the water services sector in South Africa, and to set

out the framework that will enable the sector vision to be achieved. The Strategic Framework was aimed at informing the development of detailed strategies to give effect to the framework.

The Strategic Framework indicates that the primary responsibility for ensuring the provision of water services rests with water services authorities who "must ensure the provision of effective, efficient and sustainable water services (including water conservation and demand management) either by providing water services themselves or by selecting, procuring and contracting with external water services providers. The provision of water services also includes communication activities related to, amongst other things, gender-sensitive hygiene promotion and the wise use of water" (DWAF, 2003). The framework also identifies the importance of undertaking institutional reform to support the improvement of service delivery as wellasto "improve the efficiency of water use so as to ensure the wise use of South Africa's scarce water resources through appropriate demand management and conservation initiatives". Importantly, the framework indicates that all water services institutions must develop an appropriate WC/WDM strategy with this strategy being carried through into the municipal Water Services Development Plan<sup>1</sup>. The principles provided in the Strategic Framework of these WC/WDM strategies are:

 Water institutions should strive to supply water in an efficient and effective manner, minimising water losses and promoting WDM to their consumers.

- Consumers should not waste water and should strive to use water efficiently.
- WDM should be considered as part of the water resources and water services planning process.

To support this, the Strategic Framework indicates that guidelines to assist water services institutions to develop appropriate WDM strategies and programmes, will be developed.

The White Paper on Agriculture (1995) recognises that agriculture is an important primary component in the national economy and for the community. It further recognises that the role of agriculture in the rural community must be coordinated with the roles of the other government departments, nongovernmental organisations, and private enterprises involved in and willing to rebuild and strengthen South Africa's rural communities. With that notwithstanding, the White Paper notes that South Africa is a country lacking sufficient water supplies while also characterised by a scarcity of high potential agricultural land. The paper, therefore, demands that agriculture utilises these two resources to ensure the sustainable production of agricultural products.

The **Mine Water Management Policy (2017)** is aimed at ensuring improved water quality management and reduction of water pollution, including through Acid Mine Drainage (AMD) treatment, the strengthening the protection of water resources from mine water contamination from short to long term, and providing a basis for holding parties potentially liable for negative effects and damages through AMD-related pollution.

The White Paper on the Energy Policy (1998) was developed to clarify government policy regarding the supply and consumption of energy for the next decade. This White Paper gives an overview of the South African energy sector's contribution to GDP, employment, taxes and the balance of payments. The main objectives of the White Paper are to increasing access to affordable energy services, improve energy governance, stimulate economic development, manage energy-related environmental impacts, and secure supply through diversity.

### 3.3 STRATEGIES AND OTHER INSTRUMENTS

The National Water and Sanitation Master Plan (NWSMP) (2018) recognises that building a water secure future will require proactive infrastructure management, effective water infrastructure operations and maintenance, and an overall reduction in future water demand, considering infrastructure while development and augmentation, if necessary. Management of NRW is central to the achievement of these objectives, based on the principle that measurement and monitoring of water resources is the foundation of sound decision making, allocation of resources, and effective implementation.

The National Water Resources Strategy (NWRS) 2 (DWA, 2013) builds on the first NWRS (NWRS1, 2004). The purpose of the NWRS2 is to ensure that national water resources are protected, used, developed, conserved, managed, and controlled in an efficient and sustainable manner. The NWRS2 acknowledges that South Africa is a water-stressed country and is facing several water challenges and concerns, including security of supply, environmental degradation and resource pollution, and the inefficient use of water. Considering the urgency to protect our water resources and the adverse effects of climate change, the NWRS2 submits that WC/WDM should be a priority, and measures should be taken to reconcile demand

<sup>&#</sup>x27;Noting that Section 9 of the National Water Act stipulates that the Catchment Management Strategy must take account of the Water Services Development Plan

and supply to provide for the national goals of a better life for all through job creation and economic growth.

The **NWRS3** was Gazetted for public comment in 2022. The new edition of the NWRS provides the three core principles set out in the 2004 National WC/WDM strategy as being essential to the realisation of WC/WDM:

- Water Institutions should endeavour to supply water in an efficient and effective manner by minimising water losses and promoting WC/WDM to their consumers. Water institutions (including water and sanitation services institutions) should ensure that they reduce the level of leakage in any water works or water and sanitation services works to an optimal level. They must implement measures that promote WC/WDM to their consumers on an ongoing basis.
- Consumers should endeavour to use water efficiently. As far as possible, all consumers in South Africa should not waste water and should endeavour to use water efficiently. Water wastage can be defined as the use of water without any direct benefits being derived. The non-efficient use of water can be described as water used above a desirable benchmark for a specific purpose, or water used where very little benefit is derived.
- WC/WDM should be considered as part of the planning processes for water resources, water supply (to agriculture, domestic, industry, mines and power generation) and water and sanitation services. The implementation of WC/WDM measures could provide a more cost-effective or appropriate solution to the reconciliation of the growing water demand on existing water resources or infrastructure. Where water is used inefficiently, WC/WDM could postpone the need for capital infrastructure such as dams and bulk treatment works. The resources, scope of work and prioritisation of WC/WDM activities

should be determined through an integrated planning process.

It is also rightly noted that the development and implementation of WC/WDM must consider the integration of the Water Energy Food nexus, as included in the National Water Security Framework, and its implications for future water security.

Building upon these principles the **NWRS3** lays out 5 key strategic objectives to be achieved to ensure improved implementation of WC/WDM. These are:

- Strategic Objective 1: To ensure that all sectors use water efficiently and effectively to enhance existing WC/WDM programmes across all sectors.
- Strategic Objective 2: To raise the importance and the need for a change of attitude and behaviour in terms of how water is treated and conserved by all South Africans through education and awareness programmes.
- Strategic Objective 3: To ensure all water use sectors set WUE improvement targets and implement programmatic WC/ WDM projects to achieve these set targets.
- **Strategic Objective 4:** To align the water use authorisation process with WC/WDM priorities and encourage interventions to improve WUE.
- Strategic Objective 5: To strengthen capacity within the DWS and the water sector as a whole to implement WC/WDM programmes through institutional development, training and capacity building initiatives.

The **Regulations relating to Compulsory National Standards and Measures to Conserve Water (GNR.509 of 8 June 2001)** under the Water Services Act (No. 108 of 1997) provide for the protection of consumers and Water Service Authorities and ensuring the application of sound management principles.

The DWS Strategic Plan for fiscal years 2020/21 to 2024/25 (Vote 41) sets out a performance target approach to WC/WDM, highlighting its importance as one of the priority implementation areas for the DWS. The Strategic Plan also clarifies that set targets could be met using existing grant mechanisms, considering the impact of WC/WDM on bulk infrastructure requirements. The strategy includes a requirement for the development of individual sector WC/WDM strategies for agricultural, water services and industrial, mining, power generation, with targets set for each water use sector.

The No Drop Assessment is a comprehensive audit and gives an inclusive view of the WDM business of the WSA, based on the use of a wide range of Key Performance Areas. It answers questions on planning, finance, technical skills, performance, etc. In the longer term, the No Drop assessment scorecards will become a high value source of data and information in specific areas, or in attaining a holistic view of the WSA's capacity, capability and performance in addressing WC/ WDM successfully. The No Drop assessment and evaluation process has been designed to provide focus points, and to channel effort and energy to build competencies and positively impact on current performance pertaining to water use efficiency. For this reason, the No Drop Certification scorecard seeks to select the key areas (institutional, social, technical, economical and legal proficiency) required for the sector, that, if strengthened, will help improve the current level of water losses and NRW in the municipal sector in South Africa. In addition, No Drop endeavours to:

• Develop an incentive based, regulatory environment to improve

service delivery and water security and reduce water losses and non-revenue water;

- Provide a guideline to water services institutions to reduce water losses, NRW and improve efficiency;
- Incorporate the full water services cycle of the WSA by targeting political and management levels, finance and technical departments and users;
- · Reduce duplication; and
- Align and complement the Blue Drop, Green Drop and regulatory performance measurement system.

The No Drop was successfully launched in 2013, with the publication of various reports in 2015. However, the DWS has not successfully rollout the programme as planned, and the programme has lost some of its impetus.

From the above discussion, it is clear that WC/WDM has been fully integrated into the national legal, policy, and strategy instruments. With water being identified as key to ensure social, economic and environmental viability, sustainability and growth, the need to take improved strategic action to support WC/WDM is imperative. The increased pressure being placed on water resources under growth scenarios, the declining range of options for water supply infrastructure solutions, with the increased impact of climate change, will require a range of interventions to provide a comprehensive approach to improving WC/WDM across the country. Key themes that surface from these various instruments can be summarised as:

- The DWS has the responsibility to drive and develop approaches to upscale WC/WDM.
- There is need for improved policy and strategy to support WC/WDM nationally as well as within key sectors.
- It is necessary to ensure sectors use water efficiently supported by the setting of targets.
- It is important to develop methods, guidelines and tools to support transformational changes in WUE.
- Water use authorisations and regulations should be improved coupled with the need to ensure compliance and enforcement.
- Better monitoring, reporting and evaluation protocols is needed to drive adaptive management responses.
- Institutional capacity and to train/upskill staff is required.
- Awareness creation and knowledge management that supports behavioural change must be promoted.

The Department of Agriculture, Land Reform and Rural Development (DALRRD) has developed its **National Strategic Plan for Agriculture** for the period covering 2020 to 2025 to guide its efforts in implementing the imperatives of the NDP. The plan outlines 6 outcomes that must be accomplished in line with the government's 2020/21-2024/25 Medium Term Strategic Framework. With reference to the focus of this Strategy, Outcome 4 addresses aspects of increasing agricultural production in yields, volumes and efficiencies, through the sustainable use of natural resources, technologies and management of risks. This outcome would be the measurement of the agricultural output and agricultural input.

The **National Energy Efficiency Strategy** came into effect in 2005 and was revised in 2008 and 2011, strives for affordable energy for all and to minimise the negative effects of energy usage on human health and the environment through sustainable energy development and efficient practices. The recently updated strategy prioritises energy efficiency programmes and has an overall target of 12% of energy efficiency for the country, 10% for residential and 15% for other sectors by 2015.

### 3.4 INSTITUTIONAL AND GOVERNANCE FRAMEWORK

Through the NWA and NWRS, the concept of IWRM was introduced with water conservation being considered as part and parcel of good IWRM practice. The NWA provides for the establishment of several water institutions including the DWS, CMAs and Water User Associations (WUAs). DWS (and its regional offices) is mandated to oversee and regulate the use of South Africa's water resources including formulating and implementing national policy to ensure water resources are protected, managed, used, and conserved sustainably. At a regional level, CMAs are responsible for managing, developing, and protecting water resources within their WMAs while WUAs are mandated to manage water on behalf of end users (DWS, 2000). In compliance with the NWA and the drive to conserve water, both CMAs and WUAs can implement measures and programmes within their areas of jurisdictions that promote WC/WDM. In this regard they have a key role to play in support of implementing CMSs that will incorporate clear actions to drive WC/ WDM. Building capacity and delegating powers and duties will be an important step to enable these institutions to realise impact.

Similar to the NWRS and NWA, the Water Services Act further enshrines the need to conserve water while also ensuring the right to access basic water supply and sanitation services. Through the Act as well as the Municipal Structures Act, local government is placed with the responsibility of supplying water and sanitation services at a local level. In order to comply with the Water Services Act, these municipalities have to be designated WSAs which are responsible for carrying out water supply and sanitation services. However, not every municipality is a WSA with only 169 of South Africa's 278 municipalities being WSAs. Considering this, municipalities (and WSAs in certain instances) can enter into contractual agreements with water service providers to perform these functions for the municipality. Often, these are water boards who are organs of state established by the Minister of Water and Sanitation and are mandated to provide, as their primary activity, bulk water services to other water service institutions (WSIs) within a specific area. Depending on the contractual agreements in place, most municipalities, WSAs, water boards and water service providers implement some form of WC/WDM including conservation measures being levied on users as a condition of supply (Trade and Industry Chamber , 2009). The institutional framework for the water sector is presented below and includes water services and water resource management.



Figure 3-1: Institutional framework for the water sector. Adapted from the National WC/WDM Strategy (2004).

However, while the NWA, NWRS and Water Services Act provide for the establishment of relevant institutions to undertake WC/WDM initiatives, the difference in operational boundaries between water resource management and water services have introduced complexity in managing WC/WDM across the different institutions. The National WC/WDM Strategy (2004) attempts to resolve this issue by detailing the roles of the different institutions with regards to WC/WDM implementation, coordination, and planning (see Figure 3-2). It notes that CMAs are responsible for undertaking WC/WDM measures at a WMA level while municipalities and WSAs focus on WC/WDM amongst domestic and industrial users within their areas of jurisdiction. There are also other local WSIs such as bulk water suppliers, water boards and water service providers that play a role in WC/WDM. Following this model, CMAs should also coordinate activities of WSIs within their WMA alongside bulk water suppliers and WUAs in the area (DWAF, 2004). Bearing the above in mind, the roles and responsibilities of the different WSI institutions in South Africa are detailed below:

Role of DWS	Role of CMA	Role of Water	Role of WSA	Role of WUA
<ul> <li>Coordinate national functions</li> <li>Develop generic tools &amp; guidelines</li> <li>Develop policies &amp; regulations</li> <li>Perform regulatory functions &amp; support implementation where applicable</li> <li>Coordinate measures to promote water education &amp; awareness</li> <li>Promote WC/WDM to all water institutions</li> <li>Evaluate and monitor the implementation of WC/WDM by WSIs.</li> </ul>	<ul> <li>Develop WC policies &amp; parameters within Catchment Management Strategy (CMS)</li> <li>Set conditions for water use authorisations</li> <li>Ensure implementation of NWA regulations</li> <li>Develop CMS including reconciliation of supply &amp; demand in WMA</li> <li>Develop specific WC/WDM strategy for WMA that is based on cooperation with other relevant institutions</li> <li>Coordinate WC/WDM related activities of all institutions within WMA</li> </ul>	Board • Coordinate establishment & implementation of regional water services WC/WDM strategy within its area of supply • Assist weak WSAs in implementation of WC/WDM measures when required • Implement WC/WDM measures directly related to its own service provision functions • Coordinate implementation of regional WC/WDM measures • Participate in development & implementation of CMS.	<ul> <li>Incorporate WC/WDM in Water Services Development Plan (WSDP) &amp; ensure implementation by Water Services Providers (including Bulk Water Suppliers)</li> <li>Develop &amp; implement own local WC/WDM programme in line with the regional WC/WDM strategy and WC/WDM policies of the CMS</li> <li>Ensure, evaluate &amp; monitor implementation of WC/WDM measures by the WSPs.</li> </ul>	<ul> <li>Control raw water storage &amp; conveyance infrastructures at the local level with aim of limiting water losses</li> <li>Ensure that all water used or conveyed to water users is measured accurately &amp; reliably so that losses may be quantified &amp; remedied</li> <li>Monitoring &amp; prevention of unlawful water pollution or degradation of water quality</li> <li>Development &amp; implementation of WC/WDM components of Water Management Plans</li> <li>Support to farmers by advising on latest water efficient irrigation tech</li> </ul>
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Figure 3-2: Roles of the different institutions in terms of WC/WDM. Adapted from the National WC/WDM Strategy (2004)

In support of establishing a holistic approach to WC/WDM that incorporates the different WSIs and players in the water value chain, several frameworks and supporting strategies were developed after publication of the National WC/ WDM Strategy (2004). This includes DWS's WC/WDM Strategies for the Agriculture, Water Services and IMP Sectors, all of which aim to provide an overarching framework for the different sectors in South Africa that have major roles to play in WC/ WDM. Furthermore, the SALGA's Framework for Water Conservation and Demand Management (2008) also seeks to ensure a consistent and standardised approach to WC/WDM within municipalities. These various documents are aimed at supporting the different WSIs and sectors in implementing WC/WDM that is in line with national objectives as outlined in the National WC/WDM Strategy (2004).

However, despite these tools, institutional and governance While challenges remain. the National WC/WDM Strategy (and associated documents) sought to clarify roles and responsibilities of different sectors with regards to WC/WDM, the country's overall complex institutional arrangements have made implementation challenging. This includes difficulty in distinguishing what measures are included under WC/WDM and how far WSIs', private sector's and other government departments' WC/WDM responsibilities extend in relation to each other. The linkages and relationships between different sectors and institutions, in terms of WC/ WDM implementation, coordination, budgeting and planning, are not clearly defined and certain sectors (specifically power generation), despite having a significant role in WC/WDM, are lacking overarching institutional frameworks to guide their WC/WDM programmes and interventions. In addition, limited intergovernmental and cross-sectoral coordination have hindered attempts at local level for the integration of WC/WDM programmes. This is further exacerbated by inadequate technical and financial resources, particularly within local municipalities, to sufficiently plan and implement WC/ WDM programmes throughout their areas of jurisdiction.

The National State of Water Report for South Africa (2021) elaborates further on some of the institutional and governance challenges in WC/WDM including inadequate budgeting and planning by local municipalities; limited emphasis on WC/WDM by municipalities; lack of capacity and skills within DWS' **Regional Offices and CMAs to support** WC/WDM amongst municipalities; and insufficient coordination and collaboration between SALGA, the Department of Cooperative Governance and Traditional Affairs

(COGTA) and municipalities to support capacity constraints (DWS, 2021). Similar challenges exist between the various sectors. Noting these challenges, and the institutional complexities, the various institutional roles for WC/WDM are summarised in Table 3-1.

#### Table 3-1: Institutional roles for WC/WDM

Institution	Role in WC/WDM			
Department of Water Affairs and Sanitation	Develop policy, regulation, generic tools, and guidelines promote and monitor the implementation of WC/WDM by all WSIs, including WUA, and water users.			
Department of Agriculture, Land Reform and Rural Development	The mandate of the Department of Agriculture, Land Reform and Rural Development (DALRRD) includes developing agricultural value chains, providing agricultural inputs, and monitoring production and consumption in the agriculture sector, as well as facilitating comprehensive rural development. While having a range of legislative and policy instruments that interface with the water sector they are responsible for the implementation of the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) which makes provision for control over use of the country's natural agricultural resources to conserve soil, water sources and vegetation.			
Department of Trade, Industry and Competition	Required in schedule 1 of NEMA to develop Environmental Implementation Plans (EIPs). A part of the EIPs is that the Department of Trade, Industry and Competition (DTIC) must assist industries through the National Cleaner Production Centre (NCPC) to improve resource efficiency and cleaner production. This also includes energy and water efficiency.			
Department of Mineral Resources and Energy	This is the National Department mandated to regulate, transform and promote the minerals and energy sectors, in line with the national strategic instruments such as the NDP and NWRS3.			
Department of Cooperative Governance and Traditional Affairs	This is a National Department mandated to improve cooperative governance across the three spheres of government, in partnership with institutions of traditional leadership, and to ensure that provinces and municipalities carry out their service delivery and development functions effectively, in line with the WSA.			
СМА	Develop an implementation plan WC/WDM as part of is Catchment Management Strategy (CMS), ensure and monitor the implementation of WC/WDM by bulk water suppliers, the Water Services Authorities (WSA) and the major water users, coordinate multisectoral regional WC/WDM plans, including the setting of targets.			
WSA	To include WC/WDM as part of its Water Services Development Plan (WSDP), being consistent with the NWRS and the CMS of the CMA within which it operates, develop implementation plan for WC/WDM component of its WSDP, ensure and monitor implementation of WC/WDM by WSP and bulk water suppliers.			
Water Boards	Contribute to the development the WC/WDM component of the CMS or WSDP, assist bulk water users, implement WC/WDM measures related to its own service provision, coordinate the implementation of WC/WDM measures.			
Water users	Implement, in collaboration with CMA, the WC/WDM component of the CMS			
Umbrella Bodies	These bodies are member-serving associations that serve to work collectively towards a coordinated approach. Some of these bodies include, amongst others:			
	<b>AgriSA:</b> Their vision is 'to ensure an inclusive and prosperous agricultural sector and, through living and respecting its values and with the cooperation of its members, to fulfil its mission, namely 'We enable farmers'. AgriSA foster close working relationships with the DWS and other role-players in the water use governance and management sector and advises on water use entitlements, raw water tariff negotiations and participates in negotiations surrounding key legal, policy and strategic instruments.			

Institution	Role in WC/WDM			
	<b>Business Unity South Africa (BUSA):</b> Is exploring, together with COGTA and DWS, the development of new water models for water related Public-Private Partnerships (PPPs) as well as the replication and scaling of existing interventions such as those employed under the National Business Initiative Western Cape drought crisis team			
	<b>Chemical and Allied Industries Association (CAIA):</b> Seeks to improve efficiency through the Responsible Care initiative where companies that are signatories to the initiative have water conservation measures in place as part of their commitment to improving the environmental performance of the chemical sector.			
	Minerals Council South Africa is the mining industry's primary representative and is a key stakeholder in mining WC/WDM measures.			
	<b>SALGA:</b> Provides support to local government transformation in a complex environment, has a clear strategic role to play in representing the interests of local government within the system of government as a whole and supporting its members to fulfil their developmental obligations, on the other. They not only represent local government in the development of policy and strategic instruments they provide support to Municipalities in developing their capacity to achieve their developmental objectives.			
	<b>SWPN:</b> Is a platform for facilitating new partnerships between DWS, the private sector, civil society to identify opportunities for the development and scaling up of projects to improve water security.			
Coalitions	These are a broader range of stakeholders, that are not sector specific, and are driven by a common goal, either through geographical location these include, amongst others, the uMgeni Ecological Infrastructure Partnership, uMhlathuze Water Stewardship Partnership, Mine Water Coordinating Body, National Business Initiative, and the Southern African Power Pool. These collectives can provide meaningful support to water users but also guide collective response to drive geographic or sector-level WUE.			
Development Finance Institutions	Are specialised organisations that invest in primarily private sector projects in low and middle-income countries to promote job creation and sustainable economic growth. A good example is the IFC Agri-processing Resource Efficiency Programme.			
Academia and Research	Research and development through academic institutions and private sector, play a critical role in developing innovative solutions, in understanding issues and in driving improvement and efficiency. These organisations help to take existing opportunities and threats and develop them into useful solutions, reducing costs and new technology and data comes to light.			
Civil Society	These organisations play a key role in advocacy of critical issues and obtaining citizen inputs into processes.			
International Collaborators	These organisations have formal or informal partnerships with countries that help knowledge transfer and information and skills sharing on an international level.			

# 4 Situational Analysis

## 4.1 STATUS QUO

South Africa is located within southern Africa's 'drought belt' and, according to the World Bank, is the fifth most water-scarce country in sub-Saharan Africa. The country's average annual rainfall is estimated at 450 mm/ annum, which when compared to the world average of 860 mm/ annum indicates the country receives about 52% of the global average (DWAF, 2004). The climate is both spatially and temporally variable, with the country being generally wetter to the east and drier to the west and the country having areas that are typified by winter and summer rainfall periods. Interannual variability is considerable and is strongly impacted by the ravages of the El Niño Southern Oscillation.

In addition, since the 1960s, South Africa has already experienced a rise in average annual temperatures country-wide, by 1.5° C. During the 2015/16 season the region experienced its warmest summer period in recorded history, in the order of 2°C warmer than the present-day average climatological temperature. This had significant impacts with many parts of the country recording the driest summer season since 1900 (Beraki, et al., 2019). In 2017 after three years of successive below average rainfall in the Western Cape, the drought in that region and the subsequent "day-zero" water supply situation in Cape Town became globally recognised as a symbol for the impact of climate variability and change.

The South African water context is exacerbated by the fact that major urban centres and growth nodes are not situated in alignment with water resource availability. These nodes, such as Cape Town, Port Elizabeth, and Johannesburg (amongst others) are therefore interconnected with key water resources through a network of bulk water transfers and large-scale dams. These transfers have enabled the continued socio-economic development of the country; however, this also means that the status of water resources within these water supply systems is very dependent on water resources within other catchments in other parts of the country. Drought in one part of the country can have significant impact on another.



Figure 4-1: Inter-basin transfers in South Africa (DWS, 2018)

The total national annual runoff is approximately 49 000 million  $m^3/a$  giving a reliable yield of surface water at an acceptable assurance of supply at 98% of approximately 10 200 million  $m^3/a$  (DWA, 2013). The most important water source areas are mostly situated in the northeast of the country, with 8% of the land area contributing 50% of

the mean annual runoff. The large dam infrastructure has a combined storage of approximately 31 000 million m<sup>3</sup> (DWS, 2018). The National State of Water Report (DWS, 2023) provided water use per sector projections as reflected in Table 4-1.

lleas costos	Water requirements (million m <sup>3</sup> /annum)				
User sector	2015	2020	2025	2030	2040
Municipal (industries, commerce, urban and rural domestic)	4 447	4 900	5 400	5 800	6 600
Agriculture (irrigation and live- stock watering)	9 000	9 500	9 600	9 700	9 800
Strategic/Power generation	362	390	410	430	450
Mining and bulk industrial	876	921	968	1 017	1 124
International obligations	178	178	178	178	178
Afforestation	431	432	433	434	434
Total	15 294	16 321	16 989	17 559	18 586

#### Table 4-1: Water use projections per sector (DWS, 2023)

Across the country's largest water supply systems, for the year 2019, the National State of Water Report 2022 indicated that storage capacity in these systems was a total of 25 912 million m<sup>3</sup>. For that year, the availability of water in terms of scheme yield was estimated at 10 278 million m<sup>3</sup>, with demand being 10 532 million m<sup>3</sup>, implying a deficit of 254 million m<sup>3</sup>. By 2040 this expected deficit is projected to more than double to 525 million m<sup>3</sup>.

Noting the above, it is important to recognise that South Africa's water resource is highly developed and there are limited further opportunities to augment future supply through the building of additional dams. This is further compounded by the fact that best sites for dam building have already been used up and that future sites will come at a high social, economic and environmental costs.

The NWSMP does indicate that the realistically accessible groundwater potential in South Africa is about 4 500 million  $m^3/a$  of the estimated sustainable potential groundwater yield of around 7 500 million  $m^3/a$ . The current use of groundwater resources is estimated to be between 3000 and 4000 million  $m^3/a$ , with some significant uncertainty due to poor registration of borehole data.

As a result, the NWRS3 and NWSMP provides a suite of options to address the increasing pressure, namely:

• **Desalination:** This includes the desalination of seawater as well as brackish groundwater, but these are

understood to be expensive alternatives that should be only used during emergency situations.

- Re-use: The indirect re-use of water at present is estimated to already account for about 14% of all available water. There are significant opportunities to upscale direct potable reuse although these infrastructural solutions will require significant investment as well as addressing issues of public perception.
- **Control of Invasive Alien Vegetation:** Estimates suggest that close to 3% of the national mean annual runoff is intercepted by invasive alien vegetation, that intercept and evapo-transpires more water than natural vegetation. Removal and containment of such vegetation improve water availability. The levels of infestation in riverine systems is significant.
- Rainfall harvesting: Rainwater harvesting involves the collection and storage of rainwater and are specifically useful in rural areas where municipal systems are failing.
- WC/WDM: In addition to making more water available, WC/WDM reduces water requirements. It is key to ensuring the sustainable use of our water resources, and to ensure that sufficient water is available for the current and future requirements. Water Conservation and other measures to manage demand will be actively promoted as a preferred option.

Noting this context, the DWS has developed a suite of WC/WDM strategies to promote WUE indicating that these

strategies would provide guidance as to a responsible approach, with multiple water sector institutions playing an important role in the implementation of these strategies.

The national strategy provided for the following objectives:

- 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.
- To create a culture of WC/WDM within all water management and WSIs.

- 4) To create a culture of WC/WDM for all consumers and users.
- 5) To support water management and WSIs to implement WC/WDM.
- To promote the allocation of adequate capacity and resources by water institutions for WC/ WDM.
- To enable water management and WSIs to adopt integrated planning.
- To promote international cooperation and participate with other Southern African countries, particularly basinsharing countries, in developing joint WC/WDM strategies.

In support of these objectives, the DWS had to realise the delivery of a number of outputs. These and their linkages to the above objectives are presented in Table 4-2.

The challenge with these outputs and their implementation is that these are not distinctive or qualified by a measurable indicator and target, and while the strategy document does generally talk to institutional roles, these outputs would most likely be delivered through a combination of departmental line functions.

Output	National Strategic Objectives	Links to Objectives
1	Develop guidelines, standards and tools to support the implementation of WC/WDM by water institutions	5
2	Promote and encourage the implementation of WC/WDM by water institutions	3 & 5
3	Monitor, regulate and establish adequate governance to ensure the implementation of WC/WDM	3,4 & 6
4	Co-ordinate the development of a water conservation ethic throughout South Africa	3 & 4
5	Ensure the implementation of WC/WDM in water resource planning	7
6	Co-ordinate and co-operate with other government departments to facilitate the implementation of WC/WDM	1,2 & 8

#### Table 4-2: Strategic Outputs and Activities for the DWS in support of WC/WDM and progress made

Through the NWRS as well as the NWSMP (DWS, 2018), the DWS has proposed a suite of interventions to address the current and future and water challenges which are projected as being a 17% deficit by the year 2030. These interventions include WC/ WDM, as well as other interventions to supplement the water supply mix, as an integral part of broader strategies needed to reconcile the available supply with the demand for water. WC/WDM is therefore key to ensuring sustainable use of our water resources, and to ensure sufficient water is available for both current and future requirements. WC/WDM is also a fundamental step in promoting water • **Goal 3:** Water must be protected, use efficiency. used, developed, conserved,

Importantly, the NWRS places considerable emphasis on the importance of water in terms of supporting national growth and development with the latest edition of this instrument being structured around three core goals:

- **Goal 1:** Water and sanitation must support development and the elimination of poverty and inequality,
- **Goal 2:** Water and sanitation must contribute to the economy and job creation, and

**Goal 3:** Water must be protected, used, developed, conserved, managed and controlled sustainably and equitably.

The NDP 2030 also sets out the priorities for WDM and projects the importance for a reduction in water demand by 2030. The NDP projects an average reduction in water demand of 15% below baseline levels in urban areas by 2030, where the baseline is taken as year 2012. The NDP recognises the differing targets that have been set for different catchments through the Reconciliation Strategies and All-Town Strategies, and as such calls for various interventions to achieve these targets.

While there is indeed a need to place some attention to the business of government and how WC/WDM is facilitated, supported and overseen by the various organs of state, there is equally a need to focus attention upon how WC/WDM can drive improved levels of WUE within the sectors of agriculture, industry, mining and power, and water services provision.

#### Agriculture

Water use for irrigation is by far the largest water use in South Africa and this is consistent with many countries around the world. According to the Water Use Authorisation and Registration Management System's database (updated in August 2016) the irrigated agriculture sector uses 12.0 billion m<sup>3</sup>/a comprising 64.8% of the total freshwater use. This is an important aspect to ensuring national food security and is the basis for the agri-processing industrial sector. Importantly, agriculture plays a critically important role in supporting a rural economy where there is considerable poverty. The levels of WUE vary considerably across the country and these inefficiencies can be linked largely to conveyance losses (in canals and pipelines) as well as through poor in-field practices. The NWRS3 indicates that the average water loss across irrigation schemes is in the order of 30%.

It must be noted that in some cases, farmers are being very efficient in their water use in order to expand production, to deal with increasingly pressured resources and also to reduce other associated costs such as energy for pumping. Unfortunately, the neglect of water supply infrastructure is an aspect that is bedevilling South African agriculture. While there is ample evidence to suggest there are problems with this infrastructure, little research has been done to evaluate its extent. The Bureau for Food and Agricultural Policy describes the infrastructure as being in a very poor state. The conveyance of water through bulk infrastructure distribution networks to the point of abstraction at the farm is problematic. It is estimated by the Water Research Commission (WRC) that approximately 50% of water is lost between the dam (where it is released) and the farm (where it is applied).

Part of the challenge being faced by the agricultural sector is ensuring that water releases for irrigation purposes are effectively timed and are appropriate to the volumetric needs of irrigators. In this regard the implementation of the WAS Release Module by the Department and SWPN has demonstrated that improvements in efficiency can be realised through the use of such approaches.

The levels of monitoring and reporting are variable across the sector and whilst some improvements have been realised in recent years, there is still much to be done to ensure that monitoring at key point within the water supply system, together with soil moisture monitoring, is improved. While there are regulatory dimensions to this, there is equally a need to introduce incentives that drive improvements in this regard. This could include aspects of pricing, subsidies and others.

### Industry, Mining and Power Generation (IMP)

These sectors tend to typically provide between 10-15% of the Gross Domestic Product (GDP) and are important in the jobs that are provided and the income generated, both nationally and internationally. The NDP places considerable emphasis on the expansion of this sector, primarily through industry and manufacturing, to fuel and support the growth that South Africa requires to underpin the national development objectives.

Water use within this sector is highly variable with this sector collectively using around 7% of all water use in the country. The IMP sectors are extremely diverse in nature and equally unique in the sense that businesses under these sectors can supply their own water, i.e., abstraction from the resource (mainly mines, power stations and some industries) and also those businesses that are serviced by water service providers, i.e., they receive water and discharge water to local municipalities. Water is used within production processes, for the purposes of scrubbing and cleaning as well as for cooling. WUE is therefore highly variable, and a slew of approaches are needed to introduce improvements through water reuse, through the introduction of water use benchmarks as well as strengthening regulatory approaches. Additionally, the importance of water stewardship is gaining more profile with larger global actors aligning with the Alliance for Water Stewardship, the United Nation's CEO Water Mandate and others. These approaches have been innovative in not only driving WUE within the factory fence, but also have enabled a collective discourse around the management of catchments the reduction of impact within these catchments.

The Department, in collaboration with the Minerals Council, has developed suite of supporting tools to guide the implementation of WC/WDM by the mines, including methodological guidance, a suite of commodity-based national WUE benchmarks for coal, gold, platinum and "other" subsectors, as well as a Standardised Water Accounting Framework to ensure uniform and streamlined reporting on water use data and/or water balances by the mines.

South Africa's electricity is predominantly produced from coal which accounts for 85.7% of the country's energy supply (Statistics South Africa, 2018). Cooling accounts for the majority of water use at a coal-fired power station. As South Africa moves towards renewable energy sources and starts to decommission coal-fired power plants, the water-use of the sector will decrease dramatically.

#### **Water Services**

The municipal and domestic use of water has been estimated at around 27% of all water use nationally. The importance of this sector to national growth and development is significant and is largely based around the country's large metropolitan centres that are supported by the large water supply systems. While the process to update the various reconciliation strategies is underway, the progress to date within these metropolitan municipalities in attaining WUE targets has been slow. Climate extremes in cities such as Cape Town and the Nelson Mandela Bay area have forced these centres to explore innovative approaches to drive down demand and incentivise improved water use behaviours.

Nevertheless, the status of NRW is of national concern with the average losses being in the order of 45%. This is above global averages and recent studies seem to indicate that this is in fact worsening.

Further, despite the range of water related challenges around the country, water consumption is also relatively high compared to international standards, with South Africa's usage of circa 217 litres/capita/day (l/c/d) being almost 30% higher than the international benchmark usage of 180 l/c/d (DWS, 2018; 2021).

Towards improvements in WUE in this sector, the No-Drop Programme has been developed by the Department with SWPN and is an incentive based regulatory programme aimed at assessing and improving the municipal WUE, water losses and levels of NRW. The initial implementation of this programme has indicated that there are significant gaps in monitoring, reporting, and planning to support improved levels of WC/WDM.

### 4.2 CHALLENGES AND OPPORTUNITIES

A number of challenges and opportunities can be distilled from the current situation assessment that are directional in terms of developing a national WC/WDM strategy. With the understanding that the sub-sector strategies will address the key issues within these sectors, the national strategy will take a more strategic view of what is required to support the sub-sector strategies and unlock issues accordingly. These have been summarised in Table 4-3.

#### Table 4-3: Summary of core WC/WDM challenges and opportunities



### Challenges

- Limited regulatory capacity: While there are some regulations and the DWS has a compliance monitoring and enforcement team, the overall framework, instruments, approach, competencies and protocols is still lacking and requires attention. Sub-sector specific instruments and approaches are needed.
- Insufficient DWS and institutional capacity: Currently the teams at national, regional as well as at sub-sector levels are under resourced noting the need to champion WC/WDM, to guide and support, as well as develop and lead regulatory actions.

There are not only regulations in place, but there is experience with the current compliance monitoring and enforcement team which can be built upon. The wealth of experience of other countries across the continent is also valuable, with some states applying far more structured regulatory regimens. The Eastern and Southern Africa Water and Sanitation Regulators Association have for example much to share in terms of establishing regulatory approaches.

**Opportunities** 

The finalisation of these strategies and supporting implementation plan will provide an opportunity to unlock additional capacity. This will require a more detailed workflow/ business process assessment to construct an operational model for WC/WDM. Furthermore, the unlocking of the process to establish CMAs provides the opportunity to strengthen the capacity at these more local levels.

	Challenges	Opportunities
3)	<b>Weak cooperative government:</b> Despite the recognised need there is still poor cooperation horizontally between sector departments as well as vertically between the spheres of government. This is exacerbated by resource constraints.	The challenges in catalysing cooperative government at national government levels are significant, however, this becomes less difficult at provincial and local levels. A bottom-up approach may result in the required shifts. The use of key partners to assist in enabling these cross- sectoral approaches is important. This includes SALGA, SWPN, NEPAD Business Initiative, Agri SA and others.
4)	Limited implementation of the reconciliation strategies, NWSMP, NWRS2, etc.: The implementation of key sector strategies has stalled the progression of key strategic interventions. This is particularly concerning regarding the weak implementation of WC/WDM within municipal areas.	The revision of the reconciliation strategies is underway as is the development of the national water balance perspectives. The development of these instruments provides the opportunity to reposition WC/WDM as well as to incorporate processes to ensure implementation.
5)	<b>Uneven monitoring and reporting:</b> Monitoring, reporting and evaluating progress is necessary to support adaptive management, however, there are gaps across sectors, spheres of government, and between line functions. This requires dedicated effort together with an integrated approach.	While all government departments undertake planning linked to the Annual Performance Plan this is not effectively integrated or at sufficient levels of detail. There is a need for a more programmatic project management approach, and with the development of shared platforms the capturing of information is much easier, swifter and supportive of quality assessment. The use of platforms such as "No Drop" are also an opportunity to transform the approach to monitoring and reporting.
6)	<b>Lack of sustainable financing models to support</b> <b>interventions:</b> There are significant financial challenges that hinder the roll-out of WC/WDM process. There is a need for innovative approaches that introduce more sustainability and that can support the implementation of WC/WDM in the long- term.	In recent years there has been much focus on making the water sector "fit-for finance". There is a better understanding of how blended finance solutions can be catalytic in introducing capital to support interventions, particularly where this involves infrastructural improvements.
7)	<b>Limited private sector involvement:</b> The innovation and business orientation of the private sector, as well as the skills and competencies needed are often lacking, particularly in the water services arena where WSAs are often weak.	As with shifts in the understanding of financial opportunities there has been an improved awareness of the need to unlock Public Private Partnership, to use Performance Based Contracts and so forth. These approaches can bring in private sector skills and the nature of contractual arrangements can drive significant change.
8)	<b>Poor understanding of WUE:</b> Despite the scarcity of water, people in South Africa are still inefficient with water use and do not understand the need for a paradigm shift in water use behaviours. This is particularly so in the water services arena where per capita water consumption is high compared to global averages.	Insufficient effort is being applied to shift behavioural awareness and to adjust practices. The launch of these WC/WDM strategies in conjunction with the NWRS3 and the revised reconciliation strategies provides the perfect opportunity to undertake a significant awareness campaign. The use of partnerships in driving home key messages is critical.

### 4.3 THEORY OF CHANGE

WC/WDM takes place across a range of scales, across administrative boundaries and institutions and across various sectors. The strategies required to realise improved WC/WDM will cut across social, economic, technical, and legal/ institutional pillars. These four pillars also influence and drive the theory of change.

IWRM is a principle-based approach and as such the integration of these principles into a range of governance instruments is a key part of the journey towards ensuring that water resources are managed sustainably. However, many countries are indeed struggling to realise many of the key elements that IWRM is comprised of. In this regard, in 2021 progress towards SDG 6.5 (By 2030, implement IWRM at all levels, including through transboundary cooperation as appropriate) indicated that the global rate of progress towards achieving the implementation of IWRM will need to be doubled if the target is to be met (UNEP, 2021).

While establishing the appropriate governance frameworks and management and financing arrangements are critically important and are a key element of the ability to sustainably manage water resources, it is being increasingly recognised that the ability to ensure sustainable water resource management cannot only be a function of the public sector through the various spheres of government. As such this is recognised in the construct of SDG 6.4 that is focused upon addressing water scarcity, aiming to ensure there is sufficient water for the population, the economy and the environment by increasing WUE across all sectors of society. Indicator 6.4.1 is specifically focused upon ensuring change in WUE over time and is computed by collecting data from three core sectors:

- Agriculture (the production of food, fibres, wood and related products, grouped under agriculture);
- Industrial production (of goods, energy, mining and construction); and
- Services (including households) (FAO and UN Water, 2021).

This recognition has effectively been mirrored through the increased interest of the private sector in water stewardship with the recognition that the management of corporate risk to water needs to be engaged through involvement and participation at catchment scale, while 'internally' improving WUE and reducing environmental footprints. In effect, the sector reviews and international case studies reflect that a number of key challenges exist that will inform the approach used to improve WC/WDM as a key aspect of IWRM. The UNEP 2021 review of these key challenges facing the implementation of IWRM was based upon an assessment of 171 countries and there is significant coherence with the South African experience and reflect the issues facing that of WC/WDM. These include:

- Lack of alignment and coherence between policies supported by limited institutional collaboration and coordination between water-related sectors and stakeholders, at a range of scales including transboundary, national, catchment and local levels;
- Poor capacity of institutions to enforce legislation and regulatory instruments, underpinned by the limited capacity of water professionals to develop and implement cross-sector programmes;
- Insufficient financing and lack of capacity to absorb and disburse funds, as well as introduce new financing mechanisms;
- **Inadequate monitoring and reporting** underpinned by poor data and information sharing by users and between sectors,
- Limited understanding of the importance of implementing WC/WDM among water-related sectors, across government ministries, and stakeholders; and
- Insufficient political commitment at the highest levels, and across sectors, to prioritise actions in support of the implementation of IWRM and effective WC/WDM (UNEP, 2021).

Noting these, and the lessons gathered to date, it is possible at this stage to develop an initial "Theory of Change" towards an improved strategy for WC/WDM. This outlines in a prioritised manner the problems being faced, the key barriers that would need to be addressed, the key focus areas for change as well as the impact that the strategy would hope to realise (Figure 4-2).



Figure 4-2: Theory of Change

Importantly, the three focus areas for change provide the core elements that could potentially comprised a strategic framework for action that will realise impact in WC/WDM. These three core areas are:

• Effective government structures to oversee and regulate the implementation of WC/WDM: The governance framework for WC/WDM is particularly complex involving the differing spheres of government as well as differing sectoral leads in government. There is a need to create coherence both vertically and horizontally across the spheres of government to ensure consistency in policy and alignment in legislative instruments (including regulations). Noting the developmental pressures faced by South Africa whilst facing increasing levels of water scarcity and water supply challenges, the need for a 'single government' approach is imperative. It is also important to emphasise that, due to

the connectivity of the catchments/ WMAs through bulk water supply transfers, spatial alignment and coherence is equally important. In strengthening governance, it is important to be aware of the various gaps that require resolving (Figure 4-3). This governance framework must be supportive and normative in terms of practices, tools and financial instruments that will support the implementation of WC/WDM.



Figure 4-3: Multi-level governance framework gaps (OECD, 2011)

- Strategic development and management of best practice, supporting tools, and financial instruments that guide the effective implementation of WC/ **WDM**: At the business end of WC/WDM there is a need to shift water use behaviours, improve the practices, approaches and technologies that really underpin WC/WDM implementation, undertake betterments to infrastructure as well as develop new infrastructure to improve WUE and support water conservation, as well as ensure that there is a sustainable approach to the financing of the various interventions needed to ensure WC/WDM is consistently applied. While the governance framework must provide for the enablement of this operational environment, there is a dire need to normalise the way in which WC/WDM is undertaken and this will require the development of operational policy tools, standard operating procedures, guidance materials and supporting toolkits. Equally important in supporting this will be efforts to build capacity, exchange knowledge and introduce innovation.
- Knowledge management, capacity building and innovation are leveraged to support improved WC/WDM implementation: There are significant concerns regarding the levels of capacity and awareness

of the country's water scarcity challenges and the importance of continued WC/WDM. Creating this capacity is not a short-term intervention, neither is it an intervention that has an end. Ensuring that government departments have the capacity (skills and staff) to manage and oversee the implementation of WC/WDM is an imperative first step noting that this takes time, planning and supporting financial arrangements. This will need to be developed according to the institutional roles and responsibilities of each institution. Efforts to strengthen stakeholder awareness will equally be important and will be essential in driving behavioural changes. In the longer term, it will also be important to drive innovation and new approaches to WC/WDM and the development of knowledge management and exchange approaches will support in sharing experience and supporting continued improvements. Of course, all these interventions will need to be monitored and progress evaluated.

# 5 Strategic Response

### 5.1 VISION

The NWRS3 Vision provides the framing for the sector: "The protection and management of water resources to enable equitable and sustainable access to water and sanitation services in support of socio-economic growth and development for the well-being of current and future generations."

In support of the overarching Vision above, the vision for the WC/WDM strategies is:

"Water conservation and water demand management has been effectively implemented across all sector water value chains thereby ensuring improved water use efficiency and ensuring the sustainable use of water resources into the future."

### 5.2 STRATEGIC TARGET

Key strategic water sector instruments such as the NWRS and the NWSMP have indicated that with the current water use patterns and developmental trajectory, South Africa will face a 17% water deficit by the year 2030. Indications are that this could indeed be a conservative estimation and as such DWS is undertaking a range of studies to provide an updated assessment of water supply and demand. In the meantime, is critically important that as a country there is collective effort to improve WUE, thereby driving down water demand. Towards this end:

All water use sectors will undertake technical, social, economic and legislative interventions to ensure a 70% water use efficiency level by 2030.

This target is understood as a minimum requirement and that all sub-sectors must strive for continued improvements and innovations that will support the collective effort to drive down water demands and to set new standards in terms of attainable water use efficiency.

# 5.3 STRATEGIC PRINCIPLES

The following Strategic Principles are proposed for the National WC/WDM Framework:

 Water Institutions must supply water in an efficient and effective manner by minimising water losses and promoting WC/WDM to their consumers.

- Consumers must use water efficiently.
- WC/WDM must be considered as part of the planning processes for water resources, water supply (to agriculture, domestic, IMP) and water and sanitation services.
- Value importance of water as an economic good with vital contribution towards production, i.e., industries and agriculture.
- The public sector will promote the involvement of private sector, pressure groups and citizens to implement WC/WDM including stewardship approaches, the use of Performance Based Contracts and Public Private Partnerships.
- WC/WDM requires monitoring and evaluation (M&E) to ensure tangible impact. The feedback from these processes will be used to recalibrate and adjust the approach, as necessary.

### 5.4 GOALS AND OBJECTIVES

To enable implementation of the Strategic Principles, four Goals have been constructed. From these, ten Objectives have been created which can be used to drive the sector WC/WDM strategies.

#### The four goals are:

- **GOAL 1:** Improved leadership, institutions, and regulation.
- **GOAL 2:** Strengthened co-operative governance and strategic alignment.
- GOAL 3: Enhanced operationalisation, implementation, and performance.
- **GOAL 4:** Mobilising the sector through strengthened capacity building, training, and awareness.

These objectives emerge from the Theory of Change and are also linked to the strategic objectives for WC/WDM that have been provided in the NWRS3. These linkages are illustrated in Figure 5-1, demonstrating how the national WC/WDM strategy will underpin the implementation of the NWRS.





The National WC/WDM strategy provides the **overarching framework** for the various sub-sector WC/WDM strategies, and as such the sub-sector strategies are aligned and aim to work cohesively.

While DWS is the sector lead and will drive the implementation of WC/WDM on a national level. There are clear elements of cooperative government that require the support of other national government departments. In particular, this includes the Department of Agriculture,

Land Reform and Rural Development (DALRRD), COGTA and the Department of Mineral Resources (DMR). The support of the senior leadership of DWS in driving these cooperative approaches will be critical.

Furthermore, the national strategy provides the basis for guiding the implementation of the various strategies and for M&E of progress (Figure 5-2). The cooperative government relationships will be equally important in this regard.



Figure 5-2: The importance of collective strategy implementation supported by monitoring, reporting and evaluation.

The four goals provide for ten objectives which are discussed in more detail below. This strategic framework is provided in Figure 5-3.

# GOAL 1: Improved leadership, institutions, and regulation

- Objective 1: To develop the institutional framework for WC/WDM. Improving the governance and institutional aspects of water resource management and development will provide for the foundation for operational response to WC/WDM strategies. The various sub-sectors have varying and complex institutional arrangements and there is a definite need to ensure that WC/WDM is mainstreamed into the business, planning and resourcing to ensure the implementation of actions. This will require in some instances that interventions to strengthen institutional capacity are required, this particularly the case regarding other sectoral institutions. From a water sector perspective, the institutional arrangements as set out in the NWA and national water policy have been in flux over a number of years. Clarifying the various institutional roles and responsibilities with regards to WC/WDM is important in ensuring effectiveness in the implementation of the various strategies. Ensuring that the necessary powers and duties are delegated to institutions is essential in enabling these institutions to take up these functions. Ensuring that these institutions have sufficient capacity, the appropriate skills as well as the necessary tools and systems will be imperative to support implementation. In addressing these institutional arrangements, it will be critical to also clarify the role of the DWS and ensure that it is equally capacitated.
- **Objective 2: To strengthen and develop improved** legal and regulatory instruments. The law and supporting regulations codify policy and provides clear articulation of what is required to ensure WC/WDM is affected. The NWA does provide guidance in this regard, but it is important to strengthen both law and its supporting regulations from time to time based on improved knowledge and developments in practice. It is equally essential to review those legal instruments from other sectors to ensure that WC/WDM is effectively mainstreamed into these sectoral instruments. The review and amendment of these instruments can be lengthy and require significant engagements, however, this can have profound impact upon the water sector. It will be important to consider a range of approaches that look to incentivise behavioural changes rather than using purely "command and control" approaches, and these can be introduced in a phased and progressive manner. The role of the various water sector institutions in supporting and regulating will need to be clarified and developed accordingly. Linked to Objective 1, as these instruments are developed it will be essential to ensure that institutions have the capacity and systems to perform these regulatory roles.

# GOAL 2: Strengthened co-operative governance and strategic alignment

 Objective 3: To formalise inter-governmental frameworks to support integrated approaches and partnerships. There is recognition in the NWRS that the management of the national water resource requires the support of a range of public sector institutions and cannot only be the responsibility of the DWS. With the developmental imperative of the country being based upon scarce water and environmental resources, the ability to ensure sustainable and resilient growth will require an integrated approach. The linkages between water and other sectors are inextricable and this, therefore, requires cooperative government support horizontally between sector departments and vertically between the spheres of government. The nature of the approaches used to formalise these relationships will be variable, according to context and may include a number of aspects along the water sector value chain.

# GOAL 3: Enhanced operationalisation, implementation, and performance

- Objective 4: To engage and support the strategic development improvement and of sector infrastructure. There are a range of infrastructural solutions that will need to be considered in improving the approach to WC/WDM and that will result in improved WUE within sectors. Infrastructure takes time to plan, develop and finance and requires coordinated effort between sector partners. This process to unlock these solutions will need to start sooner, to realise impact later and will require engagements with key stakeholders such as Municipal Infrastructure Support Agent (MISA), Infrastructure South Africa, DBSA amongst others. The role of the National Water Partnerships Office in supporting and facilitating these solutions is important and will act as a hub in pulling together these various partners.
- Objective 5: To support innovation and the use of technology. The research and development agenda plays a critical role in gathering knowledge and assimilating best practice and using this to drive innovation. There are a number of key actors in this space that, as a collective, will play a key role in assisting the country to develop game-changing approaches and technologies. Providing opportunities to share knowledge and build competencies will be critical to ensure uptake and replication of the new approaches and best practice.
- Objective 6: To improve and sustain incentives and financial support for WC/WDM. Limited financial resources have been a challenge to the water sector for many years, and this has also been the case for WC/WDM. Putting in place a process to develop a financial investment framework that will support ongoing WC/WDM interventions will be imperative. This will need

to consider the economic value of water and the implications on regional economies through costbenefit analyses. It will be important to ensure that approaches are financially sustainable, and projects need to be bankable. The development of diverse and innovative financing mechanisms as well as mechanisms to reduce financial risk will be important and the National Water Partnerships Office. working with various partners, can be valuable conduit for realising these approaches. WC/ WDM incentives such as the WC/ WDM sector awards and innovation recognition awards should be reinstated to encourage the adoption of WC/WDM initiatives.

Objective 7: To enhance WC/ WDM monitoring, reporting, frameworks. and evaluation The ability to manage processes adaptively is underpinned by data and information, as well as regular reporting. This will require the support of differing government actors and the development of agreed-upon reporting protocols. These approaches need to be relatively easy and pragmatic in order to support regular reporting. Clarification institutional of

roles and responsibilities will be imperative with regards to reporting, data collation and information management.

### GOAL 4: Mobilising the sector through strengthened capacity building, training, and awareness

**Objective 8: To strengthen the** capacity of sector institutions to support implementation of WC/WDM. The revised WC/ WDM strategies will require staff with capacity and resources to manage and oversee the range of interventions outlined in the various strategies – this will include staff both within DWS and in the supporting sector institutions to understand how to translate these strategic actions into implementation. Typically, this staff would be required within the DWS, the DWS Regional Offices and possibly the CMAs. However, noting the importance of other sub-sector institutions and partners, it will be important to look at the needs more holistically. This undertaking would need to look at the various roles and responsibilities and then to develop the capacity needed within line functions to service these functional needs

**Objective 9: To develop best** practice guidelines and tools for the sectors. The DWS has over the years developed various guidelines, performance standards and benchmarking tools for WC/WDM within key sectors. Likewise, other sector focused institutions have also produced such tools. While there is a need to access these various materials and collate these into a broader WC/WDM toolkit, there will be the need to develop newer and up-to-date tools that consider the various innovative approaches that have been, and are being, developed.

Objective 10: Improve national awareness of the importance of WC/WDM. The development and implementation of a national awareness campaign will be critical in supporting the drive to change behaviours and practices. This will require longer-term programming and the support of senior government actors. The development of supporting materials and knowledge products will be imperative, ensuring that these are accessible through knowledge sharing platforms.



Figure 5-3: WC/WDM Strategy framework

# **6** Implementation Considerations

### 6.1 MONITORING AND EVALUATION

Successful implementation of this strategy will also be based on the ability of the state, particularly at the catchment level and local-levels, to implement a deliberate, systems-based, adaptive management approach. This approach must be inclusive, bringing together state, private sector and civil society players on a regular basis to review and adapt plans and actions. This adaptive management enables the refinement of strategies and plans and the refocusing of financial and human resource allocation once certain actions have been implemented or certain milestones achieved, when the expected results from implemented actions are not achieved or when new information becomes available that informs improved approaches.

The main focus of M& E is on assessing the contributions of various actors and factors to a given activity outcome, with such factors including outputs, partnerships, policy advice and dialogue, advocacy and coordination within the sector. The success of the WC/WDM strategy shall hinge on the effective monitoring of the implementation of the actions that emanate from this strategy. The DWS, as a custodian of this strategy shall put in place a resultsmonitoring framework that shall guide the implementation of this strategy. The monitoring framework shall among other things provide the actors within the sector with specific indicators and targets. As the strategy is being implemented, it will be crucial for the actors and the DWS within the sector to take stock of the gains or indeed losses that have been made over a given period through a structured evaluation process. This should be done through regular reporting on the set targets and indicators. The figure below presents a typical M&E process from which the M&E framework can be developed.



Figure 6-1: Monitoring and Evaluation Framework for Implementation

To guide the implementation of the sub-sector strategies, implementation plans have been developed for each and provides for interventions that will require the active engagement participation of multiple and national and provincial government departments, of municipalities, of the private sector and of civil society. Due to the complexity of this, and the fact that it is essential that nothing gets left behind, an effective M&E system is required. This system needs to be structured around a broader programmatic M&E that would include a reflection of impact upon water resources themselves. The DWS Head and Regional offices should be capacitated and equipped to support this M&E approach and plan. This M&E system will be progressively developed, and support could include the following:

- Coordinate forums that will track the planning and implementation of WC/WDM in the Region.
- Collect and collate data and information.
- Analyse data and compile reports to report on the progress made with the implementation of WC/WDM in the sectors and sub-sectors.
- Provide or arrange training on the various aspects of WC/WDM including the water balance calculation, metering, sectorisation, pressure management, funding, auditing, No Drop, leak detection, etc.
- Advise on the development of a WC/WDM strategy and business plan.
- Influence the allocations of funds for Water Services Infrastructure Grant, Regional Bulk Infrastructure Grant programme, etc., based on informed decision making.
- Continuously monitor and evaluate the performance of the sectors and sub-sectors towards improvement.

WC/WDM staff in the Head and Regional offices should be suitably qualified and skilled to perform audits on a biannual basis.

### 6.2 SECTOR WIDE-APPROACHES

Sector wide approaches (SWAP) are widely regarded as good or best practice when it comes to coordinating major national initiatives or drives. As the name implies, their focus is sector wide however one can apply the same philosophy to a narrower initiative such as WC/WDM. The strength of SWAPs lies in the ability to address aspects such as the following:

- High levels of complexity.
- The need to align a multitude of government institutions and hence the need for strong cooperative governance.
- The need to involve a multitude of other institutions and partners such as the private sector, civil society and International Cooperating Partners.
- A requirement for high levels of communication in order to enhance alignment, cooperation and alignment.
- Initiatives involving a wide range of strategies, actions and projects.

The typical design of effective SWAPs includes elements such as the following:

- A sound strategy or master plan that guides implementation.
- A big emphasis on collaborative structures, involving all of the key stakeholders.
- Active participation of decision makers on the structures.
- A commitment to high levels of communication, discussion and consensus decision making.
- A strong technical secretariat that supports and facilitates the workings of the various collaborative structures.
- Strong outreach processes.
- A commitment to knowledge sharing and management to facilitate adaptive management.
- A strong emphasis on action orientation to ensure that the

structures remain vital and energised.

- Strong M&E processes to support implementation and also contribute to adaptive management.
- Dedicated resources (budgets) to ensure rollout.

As is noted above, the need for an effective collaborative structure(s) is key. This is a critical enabler for the SWAP and the Water and Sanitation Sector Leadership Group (WSSLG) will prove important in ensuring this collaboration. A subcommittee or task team of the WSSLG could potentially be established that is dedicated to driving WC/WDM.

It is important also to emphasise the SWAP mechanism(s) that at national level will have to be mirrored at the provincial level if the strategy WC/WDM is to he implemented effectively. South Africa is far too big and complex to expect that national mechanisms alone will be successful. Again, the same principles apply with respect to the scope, modus operandi and the potential to utilise existing collaborative structures at the provincial level.

In conclusion on this aspect, it is worth emphasising again that WC/ WDM in South Africa is a complex undertaking, involving a multitude of players. In many respects therefore SWAP, or something similar is almost compulsory if there is to be a reasonable chance of success. It will also require strong, participative and mature leadership that is able to galvanise the support of a wide range of players.

### 6.3 ENABLING FACTORS

The NWA (Act 36 of 1998) recognises the pivotal role that WC/WDM plays in water resource management with the objective of reconciling water supply and demand. An enabling environment is required to implement WC/WDM strategies and legislation. Although local government is ultimately responsible for implementing WC/WDM in the water services sector, other government departments, institutions and citizens all have an important role to play by influencing, through co-operative governance, and implementing WC/WDM in all spheres of government and at home. The following aspects are critical to create an enabling environment.

Factor	Background	Action	
Political will and leadership	Whilst WC/WDM appears in all national strategic instruments, it falls short in its implementation. This is not an activity that sits solely under DWS, but it a country-wide imperative.	There is a need for strong political will and support to facilitate implementation of this strategy. There should be a high-level champion for WC/WDM in the sector (e.g., Deputy Director General or above) whose voice should lead the sector's efforts and direction at a higher level. Create awareness and WUE in Government. Government institutions must lead by example and fix all visible leaks and internal plumbing leaks with 48 hours as stipulated in the Regulations.	
Financing	A conducive environment is needed to attract funding for WC/WDM interventions, which is linked to the bankability of the municipality but also innovative financing mechanism and incentives.	Improved cooperative governance and SWAP provide opportunities for stakeholders and departments to pool their resources to fund WC/WDM interventions, in a more coordinated manner. Tapping into global climate financing mechanisms are also a potential way in which to fund a few the interventions required.	
Institutionalisation	WC/WDM is included as a key strategic objective in the NDP, NWSMP, NWRS3, and the DWS Strategic Plan. WC/WDM is cross cutting in DWS, let alone other Sector Departments like DMRE, Department of Trade, Industry and Competition, DARLRRD amongst others. It requires strong and focussed engagement with various other directorates and Ministries.	Elevate Directorate WUE to a chief directorate to give it the prominence it requires to make a meaningful impact. Establish defined champions in the regional offices that can plan and coordinate WC/WDM regionally. Encourage WC/WDM institutional ownership whereby sector-wide stakeholders bring in extra capacity and technologies to the lead institution in the implementation of the interventions.	
Coordination	Lack of coordination can lead to fragmented WC/WDM efforts within the sector. The implementation of WC/WDM is complex and thus there is an important need for key lessons to be shared with the entire sector. There are 13 key government departments actively involved with various aspects of WC/WDM. The roles and responsibilities of each Department must be clearly defined, and Departments must work together to achieve National objectives.	Strengthen and clarify roles and responsibilities (team effort). Establish coordination meetings <sup>1</sup> , with DWS taking the lead, to define roles and responsibilities, understand processes, procedures and programmes to avoid duplication and bureaucracy.	

Factor	Background	Action
Public support	There are 60 million water users in South Africa. A concerted effort by each water user to fix leaks and use water sparingly could significantly contribute to achieving the national target. Government has an obligation to supply water services to end users. End users have an equal obligation to conserve water and become responsible citizens.	WC/WDM promotes WUE in the home, at work and in public spaces. This will require a major outreach programme to be designed using the latest behavioural science and professional marketing techniques.
Enforcement	Clause 82 (1) of the Water Services Act (Act No. 108, 1997) states no person may continue the wasteful use of water after being called upon to stop by the Minister, a Province or any WSA. Any person who contravenes subsection (1) is guilty of an offence and liable, on conviction, to a fine or to imprisonment or to both such fine and imprisonment.	Government must enforce ALL legislation, Regulations and by-laws <sup>2</sup> .
Monitoring and Reporting	Monitoring and reporting is currently very inconsistent in some areas, and piece-meal. Without consistent and up-to-date information, it becomes difficult to make any evidence- based decision making.	A consistent and coordinated monitoring and reporting framework for WC/WDM interventions is needed for the sector to measure its progress. Better quality information, together with widespread publication by the sector lead, will provide impetus for better accountability throughout the sector.

<sup>&</sup>lt;sup>3</sup> It makes sense that these are closely linked with, or part of, the sector SWAP structures.

<sup>&</sup>lt;sup>4</sup> Noting, once again, that good practice regulation strategies nearly always combine application of both "the carrot and the stick."

# 7 Conclusions



There is an uneven distribution of water resources across South Africa, with parts of the country having more abundant water resources than others. However, many of the country's key economic areas are not necessarily located close to these water resources. As a result, the country has developed a significant number of dams and bulk water transfer schemes to ensure that water reaches these hubs. Nevertheless, the growth and development trajectory for South Africa will place increasing pressures on these limited supplies, to the extent that there will be a projected 17% deficit by 2030 (DWS, 2018). Climate change will also have significant impacts upon this. There is increasing realisation that infrastructural options for water resource development are declining and hence, WC/WDM interventions that will aim to reduce water demands and improve water use efficiency will become increasingly imperative if we are to avoid water constraining the developmental agenda.

While there are a range of strategic interventions that the DWS must lead and undertake, it is important to understand that this will require the combined efforts of all sectors of government, of the private sector and business as well as civil society and all South Africans. It is imperative that as a nation there is a change in the relationship that we all have with water and that we recognise that this scarce natural resource requires the active control, management, conservation, protection, use and development by each and every citizen.

To strengthen the approach to WC/WDM the DWS has led the development of a National Water Conservation and Water Demand Management Strategy, and this provides the framework for sub-sector strategies for Agriculture, for Industry, Mining and Power, and for Water Services. Each of these sub-sector strategies provides an implementation plan that guides the array of interventions needed to give effect to these sub-sector strategies. This will require the active support and participation of all key sub-sector partners and stakeholders, as emphasised above. Each sub-sector is inherently complex and as such there is a need for considerable innovation and the development of bespoke approaches to ensure the minimum target of 70% water use efficiency is reached. However, the expectation is that all sub-sectors should strive for continual improvements. These implementation plans have outlined priority interventions and have indicated some of the key stakeholders that are important to support these, however, it is not possible for that to be a fully comprehensive list of actors. These interventions will require all stakeholders to "put up their hands" and step forward to engage with these interventions.

To this end, the DWS as water sector lead, will continue to provide the guidance and support required to unlock processes and facilitate successful outcomes, as well as put in place the tools and systems to enable adaptive management approaches towards achieving the goals and strategic objectives that these strategies outline.

# 8 References

Beraki, A., Le Roux, A. & Ludick, C., 2019. Green Book. The impact of climate change on drought., Pretoria: CSIR.

BP, 2023. Water positive. [Online] Available at: <u>https://www.bp.com/</u> <u>en/global/corporate/sustainability/</u> <u>caring-for-our-planet/water-positive.</u> html

[Accessed 22 February 2023].Brooks, B., 1997. Water Demand Management: Conceptual framework and pollicy implemation. Management of water demand in Africa and the Middle East: Current Practices and future need. s.l.: IDRC.

DFFE, 2021. National GHG Inventory Report - South Africa 2017. s.l.:s.n.

DMRE, 2091. Integrated Resource Plan of 2019\. [Online] Available at: <u>https://www.energy.gov.</u> <u>za/irp/2019/IRP-2019.pdf</u> [Accessed 23 February 2023].

Donnenfeld, Z., Crookes, C. & Hedden, S., 2018. A delicate balance: Water scarcity in South Africa, s.l.: Institute for Security Studies (ISS).

DWA, 1997. National Water Policy, s.l.: Department of Water Affairs.

DWA, 2013. National Water Resource Strategy Edition 2, Pretoria: Department of Water Affairs.

DWA, 2013. Strategic Overview of the Water Sector in RSA, Pretoria: Department of Water Affairs.

DWAF, 2003. Strategic Framework for Water Services, Pretoria: Department of Water Affairs and Forestry.

DWAF, 2004. National Water Conservation and Water Demand Management Strategy, s.l.: Department of Water Affairs and Forestry. DWAF, 2004. National Water Resource Strategy. Edition 1, Pretoria: Department of Water Affairs and Forestry.

DWS, 2000. Water Conservation and Demand Management Strategy for the Agricultural Sector, Pretoria: Department of Water and Sanitation.

DWS, 2018. National Water and Sanitation Masterplan, Pretoria: Department of Water and Sanitation.

DWS, 2021. National State of Water Report For South Africa. Hydrologicla Year 2019/20, Pretoria: Department of Water and Sanitation.

DWS, 2021. National Water Resource Strategy. Edition 3, Pretoria: Department of Water and Sanitation.

DWS, 2022. National State of Water Report. Pretoria: Department of Water and Sanitation.

DWS, 2023. National State of Water Report 2022. Integrated Water Studies Report Number WII/IWS/NSoW 2022, Pretoria, South Africa: Department of Water and Sanitation.

Eckstein, D., Kunzel, V., Schafer, L. & Winges, M., 2019. Global Climate Risk Index 2020 :Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 2018 and 1999 to 2018, Berlin: Germanwatch.

FAO and UN Water, 2021. Progress on change in water-use efficiency. Global status and acceleration needs for SDG indicator 6.4.1, 2021, Rome: FAO and UNWater.

Goal Tracker, 2023. Goal Tracker: South Africa. [Online] Available at: <u>https://south-africa.</u> <u>goaltracker.org/platform/south-africa/</u> <u>goals/6</u> [Accessed 22 February 2023]. GRID-Arendal/Studio Atlantis, 2020. The relationship of SDG 6 with other SDGs. [Online] Available at: <u>https://www.grida.no/</u> <u>resources/13730</u> [Accessed 23 February 2023].

Leigh, F., 2021. Mapping of the National Development Plan (NDP, Vision 2030) to the United Nations Sustainable Development Goals (SDGs 2030) and the African Union's Agenda 2063. [Online] Available at: <u>https://www.undp.org/</u> south-africa/blog/release-reportmapping-national-developmentplan-ndp-vision-2030-united-nationssustainable-development-goals-sdgs-2030-and-african#:~:text=The%2-0results%20show%20that%20 the, other%20 sectoral%20 plans%20 and%20programme [Accessed 23 February 2023].

Meta, 2021. Restoring More Water Than We Consume by 2030. [Online] Available at: <u>https://about.fb.com/</u> <u>news/2021/08/restoring-water/</u> [Accessed 22 February 2023].

Morgan, A., 2018. Water Stewardship Revisited: Shifting the Narrative from Risk to Value Creation, Berlin: WWF-Germany.

National Planning Commission, 2012. National Development Plan 2030: Our future - make it work. [Online] Available at: <u>https://www.gov.za/sites/</u> <u>default/files/gcis\_document/201409/</u> <u>ndp-2030-our-future-make-it-workr.</u> <u>pdf</u> [Accessed 22 February 2023].

OECD, 2001. Glossary of Statistical Terms: Water Conservation. [Online] Available at: <u>https://stats.oecd.org/</u> <u>glossary/detail.asp?ID=2903</u> [Accessed 18 July`2022]. OECD, 2011. Water governance in OECD: A multi-level Approach, Paris: OECD Publishing.

PCC, 2022. A Framework for a Just Transition in South Africa. [Online] Available at: <u>https://pccommissionflow.imgix.net/</u> <u>uploads/images/A-Just-Transition-Framework-for-South-</u> <u>Africa-2022.pdf</u> [Accessed 22 February 2023].

PCC, 2023. About the Presidential Climate Commission. [Online] Available at: <u>https://www.climatecommission.org.za/about</u> [Accessed 22 February 2023].

PepsiCo, 2021. PepsiCo Announces "Net Water Positive" Commitment. [Online] Available at: <u>https://www.pepsico.com/our-stories/</u> <u>press-release/pepsico-announces-net-water-positive-</u> <u>commitment08172021</u> [Accessed 22 February 2023].

Procter & Gamble, 2021. A Closer Look at P&G's Net Zero 2040 Ambition. [Online] Available at: <u>https://us.pg.com/blogs/net-zero-closer-look/</u> [Accessed 22 February 2023].

Republic of South Africa, 2020. National Climate Change Adaption Strategy. [Online] Available at: <u>https://unfccc.int/sites/default/files/resource/</u> <u>South-Africa\_NAP.pdf</u> [Accessed 23 February 2023].

Republic of South Africa, 2021. First Nationally Determined Contribution under the Paris Agreement. [Online] Available at: <u>https://unfccc.int/sites/default/files/</u> <u>NDC/2022-06/South%20Africa%20updated%20first%20</u> <u>NDC%20September%202021.pdf</u> [Accessed 23 February 2023].

Savenije, H. H. & Van Der Zaag, P., 2002. Water as an economic good and demand management paradigms with pitfalls. Water international, 27(1), pp. 98-104.

Statistics South Africa, 2018. StatsSA. [Online] Available at: <u>https://www.statssa.gov.za/?p=11292</u> [Accessed June 2022].

Trade and Industry Chamber , 2009. Fund for research and industrial development, growth and equity (FRIDGE): Development of a stakeholder accord on water conservation , Pretoria: Department of Trade, Industry and Competition . UN, 2023. Goal 6. [Online] Available at: <u>https://sdgs.un.org/goals/goal6</u> [Accessed 22 February 2023].

UN, 2023. The 17 Goals. [Online] Available at: <u>https://sdgs.un.org/goals</u> [Accessed 22 February 2023].

UN, 2023. Water and Sanitation. [Online] Available at: <u>https://sdgs.un.org/topics/water-and-sanitation</u> [Accessed 22 Februart 2023].

UNEP, 2021. Progress on Integrated Water Resources Management. Tracking SDG 6 series: global indicator 6.5.1 updates and acceleration needs, s.l.: United Nations Environment Programme.

University of Notre Dame, 2023. Global Adaptation Inititiative (ND-GAIN) Index. [Online] Available at: <u>https://gain.nd.edu/our-work/country-index/</u> <u>rankings/</u> [Accessed 20 February 2023].

US EPA, 2022. Net Zero Resources. [Online] Available at: <u>https://www.epa.gov/water-research/net-</u> <u>zero-resources</u> [Accessed 22 February 2023].

Water Resources Institute, 2023. Aqueduct Country Rankings. [Online] Available at: <u>https://www.wri.org/applications/aqueduct/</u> <u>country-rankings/</u> [Accessed 17 August 2023].










